THE
ELECTRICAL REVIEW

Volume CXXVI. No. 3266

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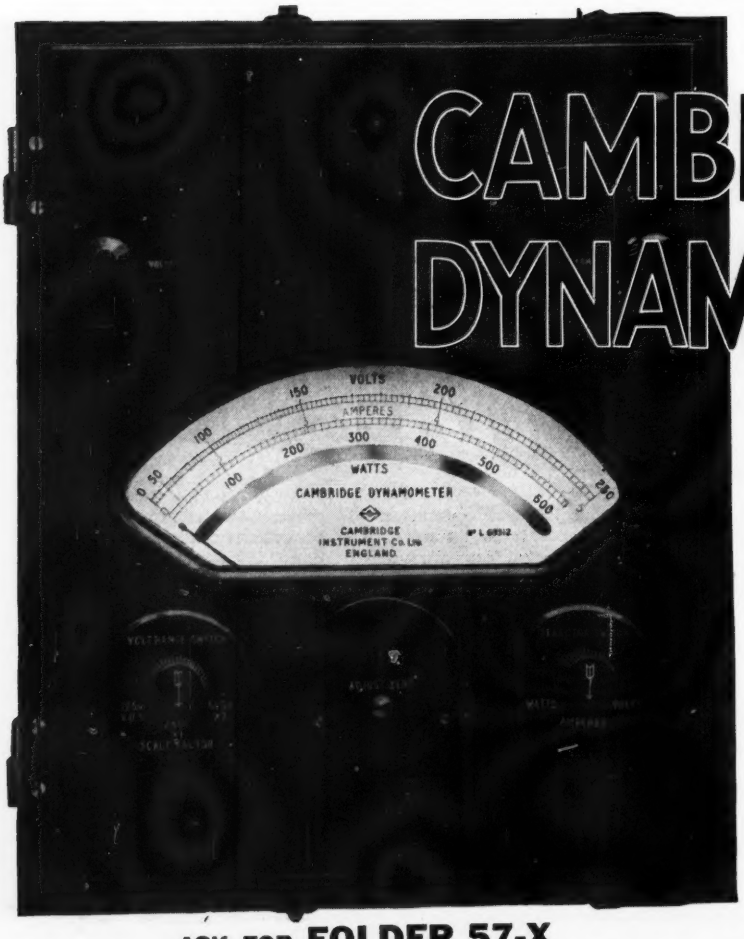

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THE
ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXVI. No. 3266 JUNE 28, 1940 Price SIXPENCE

Electricity Supply Questions

I.M.E.A. Members' Views

TO those accustomed to the intensive business and social activities at the annual conventions of the I.M.E.A., last week's substitute meeting was a very quiet affair. It would have been quieter still if the meeting had not decided, against the president's suggestion, that the four resolutions on the agenda should be proceeded with. Opinions vary in the matter of what is and what is not proper to discuss in wartime. Undoubtedly the war must occupy practically all our energies, and anything which tends to hamper our war effort must be dispensed with. At the same time we have to remember that the war is not going to last for ever and that we hope one day to resume our normal activities. It is therefore essential to maintain some sort of continuity of ideas and even to work out plans for the post-war period.

Stand-by Plant

As a matter of fact, two of the four resolutions discussed had a bearing on war conditions. The one put forward by Mr. H. Wilson, of Ashford, was designed to guard against a stoppage of supply in cases where undertakings are dependent upon a single source. His proposal was that the Electricity Commissioners should consent to the installation by such authorities of stand-by Diesel plant, which, he maintained, could be provided at an annual cost as low as £1 7s. per kW. Mr. J. W. J. Townley opposed the motion on the ground that the Commissioners were willing to consider specific cases and the Central Electricity Board was not averse from the idea of Diesel plant where it was deemed appropriate. Mr. E. E. Hoadley (Maidstone) also drew attention to the difficulty of obtaining Diesel plant at the present time and the resolution was rejected.

An Erith councillor's proposal met with a better reception. He suggested that the Government should pay due regard to the value of electricity for domestic heating purposes if it became necessary to revive the fuel rationing scheme. He pointed out, as we have done in these pages, that the principal drawback to the widespread use of raw coal is the enormous amount of transport required for its distribution, whereas the use of electricity involves carriage of coal to comparatively few points and distribution of energy by existing networks. This was not emphasised in the case presented by the electricity supply industry to the Secretary for Mines last year, although the gas industry did not overlook the matter. The mover of the resolution made a good point when he mentioned how electricity supply undertakings prevented a great deal of hardship during the prolonged cold spell early this year when the transport of coal was considerably restricted.

A further point is that approximately the same weight of coal is required to provide domestic heating by direct combustion as by electric fires or radiators and, in the event of congestion on or damage to the railways, electricity could be transmitted from one part of the country to another. That is not what the grid was intended for, the tie lines between the various regional areas having been designed to deal with plant deficiencies in emergency, but it could be used in this way to mitigate the effect of temporary coal shortage.

The cold spell was also the source of the resolution moved by Mr. C. Cameron Kirby (Alderley Edge and Wilmslow) who drew attention to the extra expense without adequate return incurred by supply undertakings whose maximum demands had shot up to unexpected levels. This subject has, of course, been very earnestly discussed ever since the cold period, but the Central Board has made out a good case for the continuance of the present method of charging

Load Factor in Evacuated Areas

Mr. W. R. Elliott (East Ham) pointed out that evacuation was another matter which should be considered in relation to grid charges. Unfortunately, from the electrical point of view it has been found that, generally speaking, increased consumption in reception areas (and, in a greater degree, the demand) has not been anything like enough to compensate for the loss of output in the towns that have been evacuated. As grid charges are based on load factor, information as to how far the latter has been affected in evacuated areas would be of interest. Mr. H. Webber suggested that the sliding scale for additional loads should be far more favourable than it is at present.

In principle there is much to be said for reductions in the sliding scale, since they tend to encourage load development. At the present time, however, growth of load is usually due to considera-

tions beyond local control, and so an incentive of this kind would appear to be hardly necessary. The matter was eventually referred to the Council for its consideration. The remaining resolution was of a purely "domestic" character, relating to the payment of the expenses of delegates attending Association meetings. Mr. R. Lee (St. Pancras) proposed that they should be met by the Association. This, too, was referred to the Council.

Restriction of Supplies

OWING to the number of inquiries which the trade associations have had to handle the period for manufacturers and wholesalers to apply for registration under the Limitation of Supplies (Miscellaneous) Order has been extended to June 30th. As that day is a Sunday the Board of Trade will accept applications received on July 1st. According to the Order the Register has to be made up by July 18th after which unregistered manufacturers and wholesalers will be forbidden, under penalty, to deal in controlled goods. In the meantime firms or individuals who have been accepted for registration are receiving letters to this effect from the Board and manufacturers should confine their supplies of controlled goods to such suppliers. The question of goods on hire or hire-purchase has been settled by limiting the restriction to the first transaction in any particular appliance or article. Component parts are not covered by the Order unless specifically mentioned, but assembly of such parts into complete articles will be considered as "manufacture." So far as the reconditioning and resale of apparatus is concerned the Board will take into consideration the extent and nature of the work carried out.

Added Responsibility

SHOULD men who are called upon to take over additional duties and greater responsibilities when their seniors join the Forces expect to receive the same remuneration as those seniors? The question has been raised by members of the Electrical Power Engineers' Association and is discussed in the Association's June journal, and the conclusion is arrived at that it all depends upon the circumstances. If the employers are making an allowance to the departed employee it would seem to be unfair to expect them to bear a double burden and thus be penalised for their generosity. In such a case it would seem that some amicable arrangement could be arrived at between the employers and the employee performing the extra duties. Where no allowance is being made there appears to be little reason for the employers to avoid paying the salary appropriate to the position.

The Favourite

ALTHOUGH the House of Commons Committee on Unopposed Bills has recently ordered for third reading three measures conferring powers in regard to the operation of trolley-buses on the Cardiff, Newcastle and Huddersfield Corporations, the proposed schemes must naturally wait until after the conclusion of hostilities. The largest is that at Cardiff, where it is proposed to convert seven tramway routes to trolley-bus operation, and it is stated that the Corporation wishes to be in a position to inaugurate the scheme as soon as possible when the war is ended. This desire to change to the newer form of transport has its counterpart in other parts of the world, so that while any consideration of the pros and cons of the different classes of vehicle for our own needs would be ill-timed, the question is of considerable importance as it affects our overseas trade. This is realised by a transport contemporary which devotes space in a special overseas transport and trade issue to trolley-bus developments in Winnipeg, Caracas and Durban. As the pioneer country in the use of trolley-buses, we should be particularly well-equipped to take advantage of the available opportunities. That there is a large public demand for trolley-buses has been shown by experience in this country; even so some figures published in America are astonishing. It is reported that a survey conducted among a cross-section of the population of Portland, Oregon, showed that 80 per cent. of the people preferred trolley-buses, 9 per cent. "street cars" and 2 per cent. motor-buses, 8 per cent. not being certain which they preferred and 1 per cent. being in favour of the present combination of vehicles.

Shipyard Lighting

SOME modification of the lighting requirements in shipyards has been made by the Ministry of Home Security as a result of experience gained since the outbreak of war and of investigations made by the Electrical Inspectors of Factories. Main particulars of the new scheme are given on a later page. For general purposes the permitted foot-candles remain at the same values (at best equal to bright moonlight), but more time is allowed for extinction after receipt of an air-raid warning. At working places, however, the intensity may reach 0.2 ft.-candle. This sounds meagre enough, compared with the 1.0 ft.-candle that is officially recognised as the minimum for general illumination at the working plane in factories, and is only twice as much as was considered necessary for mere safety in open yards in peacetime. However, our eyes have had time to adapt themselves to black-out conditions since these values were worked out. Higher intensities than the above may be used for precision work when the light can be screened, and the question arises as to whether the illumination provided in such cases should be up to those normally accepted as good practice, in view of the possible risk to operatives resulting from contrast with the low general intensities. A reasonable compromise would probably be to take the lower figure in the range recommended in "Modern Factory Lighting" for each type of work.

Air Cleaning

WHILE electrostatic precipitators have been devised for a multiplicity of industrial purposes they are known to the electrical man chiefly as a means recommended by a Committee of the Electricity Commissioners for eliminating noxious emissions from generating stations burning pulverised fuel. There are also notable instances, however, in which their adoption with stoker-fired boilers has been found advisable. What we believe to be a fresh application is reported from Ohio, where the method is used for cleansing the cooling air for two 100-HP DC motors driving mandrel bars of double-piercing mills at large tube works. The severe duty cycle entailed the employment of forced-air ventilation, but the smoke and oil present in the mill atmosphere could not be dealt with by ordinary filters. Shortly after the motors were installed a thin tar-like deposit appeared on the windings, but the introduction of an electrostatic precipitator with a capacity of 1,500 cu. ft. per min. for each motor has, the *Electrical World* states, proved effective, and after a couple of years of operation the windings have been found free from contamination. This experience suggests a field of use when the only practical alternative is a liberally rated totally enclosed motor.

Lighting Precautions

RECENT cases brought under the Lighting Restrictions Order at Luton have drawn attention to a possible source of danger to the public welfare. Apparently there was a recent failure of electricity supply in the town which continued after many people had retired for the night. When the supply was restored the police had a busy time knocking up householders who had left switches on and were consequently showing lights from their windows. The police, A.R.P. authorities or the supply undertakings should warn the public against this possibility and instruct them always to switch off again if they find that their lights have failed. There is one matter which may present a little difficulty. One of the defendants at Luton was caught out by a two-way switching arrangement, and the case against him was dismissed.

I.M.E.A. ANNUAL MEETING

Controversial Topics Discussed at Last Week's Function

AFTER having been postponed from May 30th on account of the war situation, the annual general meeting of the Incorporated Municipal Electrical Association was held on Thursday last week at Grosvenor House, London, Mr. JOHN MOULD, the President, taking the chair. The function was very largely a formal one but the attendance was better than might have been expected in the present circumstances, possibly on account of the four motions down for consideration on the agenda which raised points of interest to most undertakings. Opening the proceedings, the President explained the reasons for the postponement of the meeting last month. The minutes of last year's meeting, the report of the Council, and the accounts were then all approved and adopted without discussion. Outstanding features of the report, it will be remembered from the review in our issue of June 7th, concerned the position of authorities taking supplies from two points; the calculation of the income tax wear and tear allowance for boilers at 6¼ per cent., instead of 5 per cent.; the desirability of permitting electricity undertakings to arrange with properly licensed bodies for the rediffusion of broadcast programmes over their distributing mains; the desirability of introducing a standard AC motor with a higher power factor than the type in general use at the moment; certain relaxations in the regulations relating to overhead lines; damage to the property of electricity undertakings by trailing balloon barrage cables; and wartime restrictions on capital expenditure.

Mr. B. Handley (Portsmouth) receiving the President's chain of office from Mr. J. Mould (Leicester). Ald. W. Walker (Manchester) is seen in the background

Mr. A. E. McKenzie and Ald. A. W. Hickmott (Wimbledon)

Alternative Grid Tariff Proposed

Despite a suggestion from Mr. Mould that the movers of the four motions referred to might wish to withdraw them on account of members being too preoccupied at present with other matters to give them the care and deliberation they deserved, it was the will of the meeting that the agenda should proceed as arranged. Accordingly Mr. C. CAMERON KIRBY (Alderley Edge and Wilmslow Electricity Board) moved the following resolution: "That the Central Electricity Board be urged as soon as practicable to offer an alternative to the present grid tariff so that the annual kilowatt charge be based (say) on the average maximum demand of the four months of January, February, November and December, even if this should mean some alteration in the amount of the existing charge per kilowatt."

The necessity for an alteration in the present grid tariff arrangements, Mr. Kirby explained, was due to the greatly increased demands for energy for domestic purposes, especially for space heating. It was impossible to arrange a tariff for domestic purposes on the same lines as the grid tariff, and the two-part tariff did not offer undertakings any financial protection against increasing peak loads due to domestic consumption. As a result undertakings were faced with a considerable loss due to cold "snaps." No account was taken of whether the peak load was a "snap" one or whether it was of long duration. Undertakings which had industrial loads high in comparison with their domestic loads did not worry at present, but many competent authorities said that the domestic loads would eventually be the highest of all. With the increasing use of electric heating, cooking and water heating peaks in non-industrial areas occurred between 7 and 8.30 a.m. and in the evening, and resulted in a very poor load factor. The remedy did not lie in the hands of the distributors and the form of grid tariff as at present constituted was hard on the undertaking with large domestic loads. There was no reason why a tariff should not be devised to give them a fair alternative.

Opposing the resolution, ALDERMAN W. WALKER (Manchester) declared that only £72,000 to £73,000 extra came to the C.E.B. as a result of the cold spell. The Board had to base its estimates of plant capacity required on the returns and estimates of the undertakings themselves. If the undertakings did not take the load estimated they did not have to pay for the difference. He suggested that this difference should be paid into a "balancing fund" to level up in the case of exceptional winters. Even last winter there were many undertakings which overestimated their requirements despite the cold snap. Putting a little reserve on one side was better than having two tariffs, for the introduction of an alternative tariff was not the simple matter that some people thought. It would be extremely difficult to draw the dividing line between industrial and domestic undertakings and inevitably the former would feel that they might suffer if there were an alternative tariff.

Messrs. J. W. J. Townley (West Ham) and H. C. Lamb (Manchester)

General view of the assembly at Grosvenor House

As manager of one of the undertakings which suffered most from the cold snap Mr. A. E. MCKENZIE (Wimbledon) strongly supported Alderman Walker and asserted that nine undertakings out of ten did not reach their estimated requirements. Undertakings should pay for what they thought would be their peak load and pool the surplus.

Mr. W. P. LILWALL (Fleetwood) said that the Central Board was now finding that the morning load was 95 per cent. of that in the evening and that all undertakings were drifting towards a forenoon peak. He did not see why undertakings without generating plant should require large reserve funds; these could be used in the case of exceptional winters to balance up. The trouble lay with the municipal authorities and there was a tendency to have tariffs too low.

Mr. W. R. ELLIOTT (East Ham) said that the discussion revealed the fact that 80 per cent. of the Central Board's sales was made on loads which were unaffected by cold snaps. When tariffs were reviewed in 1943 anomalies due not only to cold snaps but also to such matters as evacuation should be considered. Mr. H. WEBBER (Keighley) suggested that individual undertakings might submit their cases to the Council for transmission to the Board. He contended that the Board did not order plant to meet the whole of the load estimated as being required, and also that there should be a far more favourable sliding scale on additional load, 30s. per kW being quite high enough after basic payments. An amendment to the motion by Mr. A. W. BARHAM (Watford) to the effect that the matter should be left for consideration in the hands of the Council was carried.

Above: Messrs. D. Ross and E. Webster (Paisley); Coun. J. N. Powrie and Mr. E. A. Logan (Erith). Right: Coun. P. Gibson and Mr. H. Wilson (Ashford); Mr. F. Swarbrick and Ald. A. Nye (Hove)

Introducing his motion that the I.M.E.A. should approach the Electricity Commission for permission for undertakings which received their supplies from single tranmission lines to install Diesel engine plant, Mr. H. Wilson (Ashford) said that it was a very serious matter for an undertaking to be deprived of its supply even for a short period. Diesel plant could be provided at a cost of £15 per kW, which spread over fifteen years with money at 4 per cent. worked out at £1 7s. per annum. Even taking into consideration the increase in running costs this was less than that of taking additional load from the grid.

Mr. J. W. J. TOWNLEY (West Ham) thought that it would be better to take specific cases to the Commissioners and for the I.M.E.A. to give their assistance in suitable instances. The Board was not opposed to the installation of Diesel plant where deemed appropriate, and it seemed therefore that the motion was not a suitable one for the meeting. To a practical comment by Mr. E. E. HOADLEY (Maidstone) asking when it would be possible to get the Diesel plant installed in the present conditions, Mr. Wilson said that he was hoping to "sow seed for the future." The motion was lost.

On a motion by Mr. R. LEE (St. Pancras) that the expenses of representatives attending meetings of the Executive Committee or sub-committees should be borne by the Association, Alderman Sir Percival Bower (Birmingham) said that before effect was given to the motion the matter should be referred to the Council to ascertain its probable effect on the finances of the Association. The carrying of the motion would institute a practice which might have far-reaching results and it might require an increase in subscriptions. An amendment referring the matter to the Council was carried.

In the absence of Councillor G. W. LUCK (Erith), Councillor J. N. POWRIE (Erith) proposed the motion that, in the event of the reintroduction of fuel rationing, the Government should pay due regard to the value of electricity for household heating purposes, particularly when, owing to transport difficulties, supplies of solid fuel were not available. They all recognised, he said, the need for electricity undertakings to be ready to bear the full share of the burden which present-day events threw on the industry and on every member of the community. The electrical industry had just passed through an extremely difficult period, during which the disruption of the war had had added to it the difficulties of the most extended spell of extremely cold weather in the whole history of the industry. During the cold spell consumers demanded not only additional heat to render their homes more comfortable, but due to the complete absence in many homes of any solid fuel, electricity was essential to maintain even ordinary comfort. The prevalence of sickness added further to the calls on electricity for the heating of sick rooms.

The Government had reason to be grateful to electricity undertakings under those difficult conditions for providing a supply of heat by wire at a time when the supply of solid fuel by railways and through streets was greatly restricted, and a great deal of real hardship was undoubtedly prevented. Undertakings knew their own difficulties and sought to avoid having them added to unnecessarily, especially since the reintroduction of rationing would limit their ability to assist at a time when their assistance would be of most value. With rationing the tendency would probably be for the ordinary consumer to save his ration for use at a time of intense cold. The peak consumption would thus be unaffected. Councillor D. E. HAYES (Bexley) said that the situation to-day demanded the most economical use of transport and the carrying of fuel to as few centres as possible. The motion was carried.

Top: Coun. J. B. Beaufoy and Mr. E. E. Hoadley (Maidstone) with Mr. F. Forrest (Birmingham). Bottom: Mr. J. W. Simpson (Secretary) and Sir Percival Bower (Birmingham)

Mr. B. HANDLEY (Portsmouth) was unanimously elected President for the ensuing year, with Mr. J. W. J. TOWNLEY (West Ham) as vice-president. Councillor W. J. LEWIS (Portsmouth) read a telegram from the Portsmouth City Council congratulating Mr. Handley on the honour bestowed on him and inviting the Association to hold its conference at Portsmouth next year. Mr. Handley paid a warm tribute to the valuable work done for the Association by Mr. Mould during his year of office. The following elections to the Council were then announced:—Councillor J. Selwyn-Jones (Newton-le-Willows), Ald. J. A. Beck (Mansfield), Mr. W. P. Lilwall (Fleetwood), Ald. A. Sturgess (Derby), Mr. C. W. Salt (Carlisle), Mr. J. D. Spark (Willesden), Alderman Sir Percival Bower (Birmingham), Mr. H. C. Lamb (Manchester) and Mr. F. H. Whysall (Belfast).

Revised Welding Tests

WHEN first issued in November, 1936, B.S.S. 709 was confined to the standardisation of the bend test for arc welds and steel joints. A revised specification includes standards for other forms of test and co-ordinate and simplifies those which are already in existence. The advantages resulting from the adoption throughout the industry of similar test pieces and the same methods so as to enable test data to be readily compared and correlated are obvious. The specification gives a general indication of the use to which each of the different tests may be put, but it does not purport to lay down any particular test. Copies may be had from the British Standards Institution, price 2s. 3d., post free.

THE PARSONS LINE

Limitations to Its Use and Some Statistical Computations

By R. C. Golding, M.Sc., A.M.I.E.E.

GENERAL recognition of the method of Mr. R. H. Parsons for assessing the performance of stations by means of the "Parsons line" has led to the adoption of this easily understood principle in solving problems other than checking the performance of a power station shift, for which it was first expounded. Now that power-station interconnection is an accomplished fact the Parsons line has come to be accepted in many quarters, on both sides of the Atlantic, as a means of comparing the performance of respective power stations over long periods of operation, a purpose for which the graph possesses too many approximations to give reliable results.

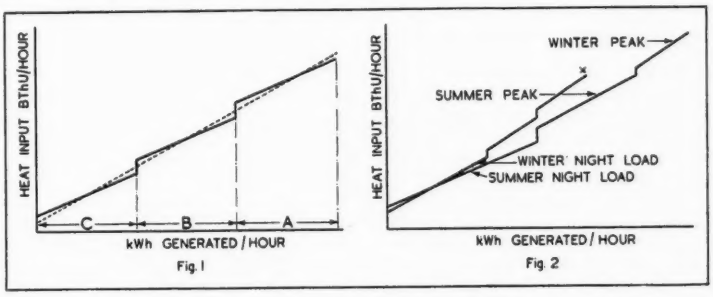


Fig. 1

Fig. 2

Imagine the case of a station with an installation of three 30,000-kW sets, any or all of which may be in use at one time. Fig. 1 illustrates graphically the allocation of heat consumed into fixed losses and a running component. To eliminate variations in the grades of fuel consumed, the ordinate is scaled in BThU per hr. consumed, the abscissæ showing the average kWh generated during each hour. All figures are exaggerated to show details.

Let us assume for the moment that a 30,000-kW set running light represents a fixed loss to the station of 20×10^6 BThU per hr. Then while all three sets are on load, the fixed heat component is 60×10^6 BThU per hr. and any outputs of the station produced under this condition would lie along the Parsons line "A." Similarly any outputs with two or one machine only on load will result in new lines shown as B & C, extrapolation of which will result in the ordinate being cut at 40×10^6 and 20×10^6 BThU.

It would appear to be obvious that the Parsons line should only be used for assessing the fixed heat component when the extrapolation is within narrow limits. In the case of fig. 1 the station line would probably be drawn from periodical readings of consumption and output, in the direction indicated by the dotted line, showing a fixed heat for the station of less than that required to run one set alone. In the case of a base-load station carrying 60 to 90 MW most of the time, this could result in an error in over-estimating the incremental heat rate of the station by as much as 8 per cent., with a consequent loss in economy where load distribution is carried out according to an ascending order of station incremental heat rates. In this case, therefore, it would appear that the station line should be replaced by a number of lines according to the number of sets in use. This, however, only applies when the sets are of similar size and when these differ the line becomes a definite curve.

TABLE I

		DECEMBER		
No. of hours	Hourly heat input	Total heat input	Hourly kWh generated	Total kWh generated
60	650×10^6	39.00×10^9	57,600	3.46×10^6
210	550×10^6	115.50×10^9	49,200	10.33×10^6
210	425×10^6	89.30×10^9	37,200	7.81×10^6
240	300×10^6	72.00×10^9	26,800	6.43×10^6
720	—	315.8×10^9	—	28.03×10^6
Average hourly	—	438.6×10^6	—	38.93×10^3

Fig. 2 is the heat consumption curve for a hypothetical base-load station containing three sets, 30, 20 and 10 MW, for meeting the winter demand, together with a spare 10-MW set for use when one of the others is undergoing annual overhaul. From the curve a synthetic Parsons line is built up as shown in fig. 3. The heat consumption equations for the three sets are assumed to be: 30 MW, heat BThU = 10,430 × kWh generated $+20\times10^6\times$ hr. run; 20 MW, heat BThU = 10,420 × kWh generated $+17\times10^6\times$ hr. run; 10 MW, heat BThU = 10,490 × kWh generated $+10\times10^6$ hr. run.

It is assumed that the station bears a two-hour peak load and an eight-hour night load, the remaining fourteen hours being split into two periods of seven hours each, with an average of some intermediate load. In fig. 2 are indicated the winter and summer demands met by the station for peak and night loads, spring and autumn months being interpolated between these extremes. In this way a table is prepared showing the heat consumed and units generated for each month, of which table I is an example.

TABLE II

Period	Fixed heat (BThU) per hr.		Error by graph
	By Parsons line	By Weighting	
Excluding June	5.0×10^6	26.7×10^6	Per cent. 81 low
Including June	8.8×10^6	27.37×10^6	68 low

This treatment is general with the exception of the month of June, when the 30-MW set is assumed to be down for overhaul, and the 20-MW and two 10-MW sets are run to meet the load. A special consumption line "X" is shown in fig. 2

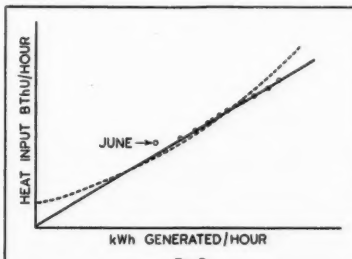


Fig. 3

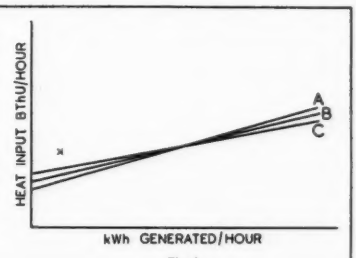


Fig. 4

to meet this conditon. It is also assumed that the incremental heat rate of each set is increased by 500 BThU per hr. during this month, owing to the effect of warm circulating water. This station bears a maximum load of 57.6 MW with an annual load factor of 56 per cent., but corresponding figures can be prepared for any station.

Plotting the monthly totals of heat consumed against kWh generated (a more accurate line is obtained by reducing these to an hourly base) fig. 3 is obtained, giving the Parsons line for the station. Extrapolation gives the fixed hourly heat for the station as 5 million BThU per hr., although each set consumes between 10 and 20 million BThU per hr. The actual equation for the station becomes: BThU per hr. = 11,176 × kWh generated + $5.0\times10^6\times$ hr. run. This is obtained by ignoring the June point which obviously gives a result not in accordance with the general performance of the station. Had the 30-MW set broken down during December and a number of smaller sets been put on to replace it, the point for this month would have lain above and at the right-hand end of the Parsons line, when its inclusion would have resulted in an increased slope to the line and a "negative" fixed heat consumption. The occasion which first brought this to light was that of a station of over 30 MW capacity which ran for two years without once showing a positive fixed heat.

The dotted line in fig 3 shows the true Parsons line for

the station, this being a curve. The point at which this curve should cut the ordinate can be obtained by weighting the hours run by the fixed heat of each set. Division by the total hours in the year then gives the average fixed heat consumption for the year. The results of these operations are as shown in table II.

It can thus be seen that due to the inordinate amount of extrapolation required, any straight line formula may diverge to a marked extent from true conditions at the crossing of the ordinate, rendering the method useless for the comparison of relative incremental heat rates of stations.

Computation of the Line

Where the results of station performance are numerically small enough to be plotted close to the ordinate, the error introduced in assuming the above curve to be a straight line is negligible. Alternatively, if only one set is in use, the resulting Parsons line will actually be straight. In practice, however, the results are often sufficiently staggered to produce a band of points an inch wide, and seldom more than four or five times this length, through which it is usual to draw an approximate line.

To achieve the desired result various mathematical and statistical methods have been used wherein the theory of prababilities is instrumental. I distinguish between "mathematical" and "statistical" as the latter can be stated to depend on an assumption rather than a mathematical formula, and are much more expeditious in practice, though both methods must, of course, revert to mathematical proofs for their justification. Of the main statistical methods the "average deviation" and the "standard deviation" are the most commonly used, and while both have advantages in usual statistical routine, the "average deviation" gives a truer line in the special conditions under which a steam station operates.

The standard deviation method, quite commonly used for this purpose, depends upon the fact that the sum of the squares of the distances of the points on a graph, from the arithmetic mean of these points, should be a minimum. The procedure is as follows: Take any number of points and obtain the mean of their "x" ordinates (heat); list the differences between each ordinate and this mean; square the differences; add these squared differences and find the mean; and take the square root of this mean—say "A." Repeat this process with the "y" ordinates (units) giving a result—"B." Then A/B gives the incremental heat rate or gradient of the Parsons line for the station.

Referring to fig. 3 it will be noticed that in a normal calculation the June point would have to be included since the points are often so widespread that it is not known which are the result of adverse conditions in the station, or poor operation or a mixture of these two. Should any such points lie wide of the true—and as yet—unknown Parsons line the standard deviation method weights these readings, and draws the final position of the line away from the usual performance of the station, which it is desired to determine.

Since the aim would be to ignore these points—were it possible to single them out—at least a method should be used which does not emphasise them. This is attained in the simpler average deviation method. This depends on the fact that the sum of the differences between a number of readings and their median should be a minimum. In this case the procedure is to list an odd number of "x" ordinates (heat) in numerical order; note the median; list the differences between each ordinate and the median; add the differences (ignoring signs); and take the mean of the difference, say—"A." Repeat this procedure with the "y" ordinate (units) giving a result—"B." Then A/B gives the slope of the Parsons Line. In this method the points lying remote from the line are given no more weight than those adjacent to it. Fig. 4 illustrates the effect of a high reading X, on the true station Parsons line assumed to be at A. Determination of the line by standard deviation will give the line C, by average deviation the line B, the slope of which is nearer to the required figure.

It can be maintained that one incorrect result can hardly appreciably affect a large number of points, but the larger the number of experimental results taken the greater will be the number of "freak" observations. Since these are often the results of annual overhauls or warm circulating water, when the output of the station is low, they will usually occur in the same section of the graph. They will thus tend to lessen the slope of the Willans line. It has been shown above that other factors tend artificially to steepen the slope, and these will to a certain extent neutralise each other. The resultant effect, however, is difficult to deduce quantitatively, and as shown in relation to fig. 3 only results in the error being reduced from 81 to 68 per cent.

Transformers and Switchgear

Recent Orders for Home and Overseas

ELECTRICAL manufacturers are able to meet the need for export, provided raw materials are avaliable, and this fact is exemplified at the works of Johnson & Phillips, Ltd. During a recent visit we inspected many transformers and switchgear which have been ordered for various countries abroad.

One example was a transformer which was undergoing tests prior to dispatch. This 7,500-kVA bank, comprising three 2,500-kVA single-phase units (with a fourth as a spare) designed for outdoor use, is to the order of the Public Works Department, New Zealand. The voltage ratio is 50/6.35 kV and and is arranged for delta/star connection to give 11 kV on the lower-voltage side.

Each single-phase unit is provided with on-load tap changing equipment with mechanical coupling between the three units. This tap-change gear is on the secondary side and compensates for variations in primary voltage of from 6 to 14 per cent. in 2 per cent. steps, and is complete with control panel arranged for manual or push-button operation. Resistances are employed for inserting between two tappings during a tap change from one to another. Double-float Buchholz protection is fitted, while further protection is provided by explosion vents with diaphragm designed to rupture at 5 lb. per sq. in. The radiators are of the detachable type with top and bottom valves.

Other examples of transformers seen were a 6,250-kVA unit for the Fife Coal Co. and a 3,000-kVA unit for the Central Electricity Board. Speech chokes, reactors and special transformers for use in broadcasting were also in evidence.

Four-panel, duplicate busbar, compound filled switchboard, with on-load selector switches, for use on 11-kV system, breaking capacity 250 MVA. The left-hand unit is fitted with busbar voltage transformer. Circuit-breakers are operated by a spring-closing device

On the switchgear side considerable activity was noted. New designs included a range of filled-type vertical-isolation switchgear. This gear is designed for maximum ratings of 1,200 A, 11 kV and 250 MVA. All the usual arrangements of single and double busbars are available, with on or off load selection in the case of duplicate busbars.

Standard practice tends towards spring closing of the circuit-breakers and upwards of seventy such equipments are going through the works. The recent development of a single automatic reclosure applied to spring closing devices was demonstrated, this being achieved without additional relays and auxiliary apparatus. In spite of the drift towards filled-type switchgear in recent years, it was clear that the truck type of switchgear still has considerable appeal.

In order to cope with the increasing demand for switchgear of the ironclad type for medium or low voltages, the section dealing with this class of work has been entirely reorganised as a self-contained production unit in a new bay and with increased facilities for production. At the same time, the machine shop has been rehoused in another new bay with the addition of many new machines and with existing machines converted to individual drive. This reorganisation, which has been carried through while maintaining production, has allowed a reorganisation of the main switchgear assembly shop, now devoted to the larger classes only.

Considerable alterations and extensions are also in hand for other parts of the works to permit increased output and the manufacture of larger engineering products.

FACTORY MAINTENANCE

Problems Under Wartime Conditions

By Harold Greaves

UNDER existing conditions the works electrical engineer is faced with the problems of obtaining essential spares, of securing skilled labour and of maintenance in the limited time allowed by continuous production for seven days per week. Nevertheless, he has only himself to blame if he has been caught out, for it was obvious that these problems would arise, and steps should have been taken to ensure a good stock of spares, including an emergency supply stored in a safety zone away from the factory. The question of skilled labour is not so acute, as the schedule of reserved occupations covers electricians, so that the quality of work now forthcoming will be reflected in the number of plant stoppages due to electrical failure. In my opinion there should be no difficulty in maintaining a standard of efficiency equal to that of pre-war days, provided that when the plant was installed quality and not merely the price was the governing factor.

As motors are now operating at high temperatures due to continuous working, special attention to overload settings, ventilation and lubrication is called for. Individual drives have contributed to increased output by making the machines more adaptable and accessible, and by reducing maintenance costs through the elimination of shafting, belting, and pulleys for speed control. By means of multi-speed AC motors a range of four speeds can be obtained, which is usually quite sufficient for lathes, drilling, milling, slotting and planing. When a wider range of speeds is required, as in grinding, a shunt or compound motor, supplied either from a self-contained motor generator or from a separate supply, is quite suitable; in either case the same course can be used to operate the magnetic chucks on the grinding machines.

The squirrel-cage motor has undoubtedly contributed to the adoption of individual drive on account of the ease with which it can be controlled, the absence of brushes and other current-collecting parts, and its ability to withstand rough treatment at the hands of unskilled operatives.

Switchgear Considerations

The amount of room available on a machine tool for the erection of switchgear is usually limited. Sometimes the control gear arrives as a separate item direct from the manufacturer, leaving its disposition to the person installing the machine. In other cases the manufacturer has co-operated with the switchgear makers and as a result the controls have been accommodated either by recessing them into a hollow casting or by the provision of a self-contained panel.

Few machines are provided with isolating switches and when these are supplied it is usually as a switch-fuse unit. The latter is bulky and often unnecessary, as the fuses in the distribution board will take care of any fault other than overload. Although the I.E.E. Regulations do not call for no-volt releases on motors up to ½ HP, it is surely a shortsighted policy to equip a machine of this class with no means of protection other than a switch-fuse, when for a small outlay an efficient starter can be fitted incorporating overload trips and undervoltage release. A fuse is of doubtful value, since the starting current of these small motors may be as much as five times full-load current, so that the fuse must be strong enough to permit of severe starting conditions which may be repeated at frequent intervals. For pump motors the conditions are particularly severe when the coolant is carrying a high sludge content, and it is false economy to omit overload protection, which may result in a burnt-out motor.

Machine Tool Motors

Little attention appears to be paid by machine tool makers to the wiring between the various motors and switchgear. In an installation comprising about 5,000 motors I have seen few machines where the wiring is capable of standing up to the severe conditions. A machine should not have inspection fittings of pressed material with lids secured by one screw only. Even a first-class inspection fitting with two screws and a stout lid should have, in addition, a watertight gasket to keep out oil.

Often insufficient care is taken where the conduit enters the starter; here again a watertight gasket is necessary, and pressed-steel locknuts should be abolished in favour of a standard coupling. Considerable use is made nowadays of flexible metallic conduit, but it is rarely of the watertight variety with watertight adaptors fitted with sweated connections. Anything less robust is of no use whatever where coolant oil is used. In one section of a machine shop I have had to rewire no fewer than twenty machines after short service due to oil penetrating the conduit. Had the trouble not been anticipated, a serious check to production would undoubtedly have occurred.

The overhead busbar system has undoubtedly revolutionised the distribution of power to individually driven machine tools, and by use of flexible conduit of the non-watertight variety, the fullest possible use can be made of machines which, due to a change in planning are required to be moved to another part of the factory. I suggest, however, that a solid conduit should be taken from the isolator on the machine to a position well clear of the coolant.

Methodical Attention

Attention given to the electrical apparatus should be organised on methodical lines and not allowed to develop into the mere carrying out of repairs when called upon to do so. Even so, minor interruptions cannot be entirely eliminated, but these should be only of a temporary nature. They may be roughly grouped as follows:—

(1) Blown fuses due to stiffness of the machine on the first start, particularly on a cold morning.

(2) Blown fuses through violent overload, viz., tool sticking or seized bearing, causing fuses to blow before the overload releases have had time to operate.

(3) Short-circuit due to oil finding its way into the conduit or switchgear.

(4) Failure of pump motor due to sludge choking the pump.

(5) Failure of complicated automatic control gear, which may be either electrical or mechanical.

Production delays through stoppage of a machine can be divided as follows:—

(a) Time lost between stoppage of machine and receipt of complaint by the electrical department.

(b) Time lost between the receipt of complaint and arrival on site of the electrician.

(c) Actual time spent on the repair.

Any method of reducing the time lost under items (a) and (b) should be encouraged by co-operation between the interested parties. I have found the following system of great value in speeding up repair work. On the failure of a machine the operator reports to his foreman, who completes a repair slip giving the department number, type of machine, machine number and some indication of the trouble. The electrician thus knowing the exact location of the machine, and having some idea of the fault, can without waste of time place the machine back into service. This obviates the possibility of wrong information being given by verbal messages. The system has other advantages, as the information given by the electrician is of value for record and brings to light the weak points in apparatus which can be rectified with results beneficial to output.

Judgment Against Supply Company

JUDGMENT by consent was given at the Lincolnshire Assizes on Saturday in an action in which Christopher Patrick Monaghan, an official of Frieston Borstal Institution, Fishtoft, alleged malicious prosecution by the Boston and District Electric Supply Co., Ltd., and two of its officers.

Mr. M. D. van Oss, for Monaghan, said the Boston magistrates dismissed a summons which alleged that Monaghan had fraudulently extracted electricity. At the same time Monaghan admitted an offence under the Electricity Acts by re-connecting the supply without the authority of the company. The trouble began when the company cut off the supply because a bill for 27s. had not been paid. Monaghan sent his wife with the money to pay the bill, and, being skilled in such matters, he re-connected the supply. He was not aware at the time that he had also to pay 7s. 6d. as a reconnecting fee. There could have been no fraudulent intent, for the electricity obtained by reconnecting the meter would be charged in the usual way. It was perfectly obvious, added counsel, that the company, not satisfied with their remedies under the Electricity Act, were deliberately bringing charges of felony as a deterrent.

Mr. Justice Croom-Johnson commented that sooner or later Monaghan must have had to pay the additional 7s. 6d. How could he have got away from paying? He then suggested a consultation between the parties, as a result of which plaintiff's counsel announced that defendants had made an offer which he had been instructed to accept. By consent there would be judgment for plaintiff against the three defendants for fifty guineas, with High Court costs.

Mr. F. W. Wallace, for defendants, said he wished to state publicly that they had really made a mistake in the matter of prosecuting under the Larceny Act, and they were desirous of saying that Monaghan was a man whose honesty could not be impugned, and of tendering their apologies to him. The judge concurred in the agreement.

London J.E.A.

Allowances to Employees

THE report of the General Purposes Committee of the London and Home Counties J.E.A. presented at Wednesday's meeting of the Authority stated that as the result of further negotiations between representatives of the Central Electricity Board, the Kingston Corporation, the General Electric Co., Ltd., and the Authority, there is now a prospect of the claims of the Corporation and the Authority for the recovery of damages and loss consequent upon the fire at the Kingston station in December, 1938, being settled amicably without further recourse to legal proceedings.

Dealing with the question of cost-of-living additions to the salaries of the staff, the Committee stated that the recommendations of the National Whitley Council had been ratified by five district or provincial Councils in the South-Eastern Area of the country. The London District Whitley Council was to consider the recommendations again at its June meeting and the Committee had decided to await the result of this meeting.

With regard to the continuation of payments of allowances in respect of employees on active service reported killed or missing, the Committee recommended that in all cases of employees reported as killed the allowances should be continued for a period of twenty-six weeks; that in the case of employees reported as missing the allowances should be continued until there was notification or a clear presumption of death, as from which date the allowances should be continued for a further twenty-six weeks; and that in cases reported as prisoners of war the allowances should be continued in the ordinary way.

The Committee has sought the opinion of the staff at Burford as to the desirability or otherwise of their returning to London. Only four members were in favour of remaining at Burford, the rest (89 per cent.) expressing a desire to be transferred back as soon as possible. Accordingly the Committee recommended that the Head Office staff should be brought back to London at the earliest practicable date.

The Local Distribution Committee reported on the subject of refrigerators for hire-purchase. It stated that the contract with Kelvinator, Ltd., had expired and recommended that a contract for the supply of refrigerators be entered into with the General Electric Co., Ltd. A variation in the existing hire-purchase terms was also proposed. The same Committee also recommended that the existing contract with Crompton Parkinson, Ltd., for the supply of kiosks should be extended, subject to a percentage increase on the existing prices and a sliding scale for copper, steel and labour variations.

The Finance Committee reported the renewal of a sanction to borrow £20,000 for mains, switchgear, &c., which was originally issued in August last.

Measuring Motor Torque

Comparison of Methods

MOST features of the behaviour of squirrel-cage induction motors are best understood from graphical representation of torque plotted against speed. Consequently every investigator concerned with this class of motor must decide what is the "best" way of measuring the torque. An attempt to do so is made in the *I.E.E. Journal* for June by Dr. A. C. W. Vincent Clarke as the result of experimental work during his tenure of the Swan memorial scholarship at King's College, University of London. Four methods are described and compared as to cost and adequacy.

Loading by means of a water-cooled brake drum is cheap and accurate at the working speeds of the motor, obtainable from short calculations. But the range of speeds over which observations may be made is very limited and it is not possible to obtain in this way data concerning regions of poor torque performance or the possibility of crawling.

A rotational accelerometer (Metropolitan-Vickers Co.) is not portable and is beyond the financial means of most organisations. Results are of moderate and uniform accuracy at all speeds, which require a considerable amount of correction for constants of the measuring apparatus. Results are obtainable at any speed, but are obscured completely near zero speed if the motor under test is started from rest (which, however, should never be necessary). Effects of parasitic synchronous torques and similar defects of torque performance are made immediately evident in the oscillograms, but are difficult to estimate quantitatively by this method.

A relatively simple motion-picture camera is cheap when studies have to be made frequently. Accuracy becomes poor as the working speeds of the motor under test are approached, but improves at low speeds. After careful analysis occupying some time, results are obtainable at any speed, though accuracy is impaired if the motor is started from rest. This method reveals regions of poor average torque performance but not parasitic synchronous torques.

The first cost of a high-speed camera (Western Electric Co.) is great, but it can be made available on hire when justified. This is a fundamental method and capable of considerable accuracy, but laborious, and so only suited to research or for providing a standard of reference. It is capable of measuring torque from acceleration with moderate accuracy at all speeds, higher accuracy being obtained at the cost of increased labour in analysis. Results are obtainable under all conditions of speed and acceleration, and it is possible, by magnifying the time axis and therefore the speed axis of relevant parts of the torque/speed curve, to obtain quantitative data on all defects in torque performance.

Lighting in Shipyards

Permissible Intensities

PARTICULARS of a new scheme of "Lighting during Black-out Hours in Shipbuilding and Ship-repairing Yards" have been issued by the Ministry of Home Security (Stationery Office, 4d.). Special safety lighting of very low intensity by means of screened hurricane lamps at danger points may be continued during an air raid. Where higher intensities are necessary, a value of 0.002 ft.-candles on the ground is permitted up to the end of four minutes after the receipt of a "red" air-raid warning. On dock sides and gangways the intensity may be 0.02 ft.-candle, but must be reduced to 0.002 ft.-candle within two minutes of the warning and extinguished after a further two minutes. Local lighting at working points and on open decks may reach 0.2 ft.-candle, provided it can be extinguished in one minute or reduced by defined stages to zero after four minutes.

Under ships' bottoms, 40-W lamps may be used subject to certain precautions and to the same conditions regarding extinction as apply to 0.2 ft.-candle. No limit is set to the intensities allowable for work involving great precision if the light can be screened and if it can be extinguished immediately the warning is given. Immediate extinction is also stipulated where screening is impossible, in which case the intensity must not exceed 1 ft.-candle.

Where materials are being erected or loaded or unloaded by cranes, illumination up to 0.2 ft.-candle may be provided in the way of the load or the point of discharge. In addition, jib and hammer headed cranes may have an approved type of spotlight, controlled from the crane cab, to keep the load clear of obstructions. Particulars of this spotlight can be obtained from the Shipbuilding Employers' Federation. Men in charge of winch-operated jib derricks may similarly be provided with spotlights. Travelling cranes should be provided with red lights. For loading and storing timber 0.02 ft.-candle is considered enough.

In addition to general movement lighting of 0.02 ft.-candle on dock sides, there should be 0.2 ft-candle available for actual docking or undocking, extending over the entrance, sides and heads of the docks. Reflection from the water must be minimised. Processes involving flames or glare should be discontinued in the open during black-out hours unless they can be effectively screened.

Interior lighting where roof lights are not screened should be reduced to 0.02 ft.-candle for movement and 0.2 ft.-candle at working points, except for the operation of machines, when higher intensities may be used if the local lamp is provided with a deep reflector shade with a sharp angle of cut-off. The conditions as to reduction and extinction of light prescribed for work in the open apply to such cases.

An appendix indicating wattage, mounting heights, spacing and reflector interiors for the various illuminating standards are included. A second appendix deals with methods of reducing intensities. Advice by the Electrical Inspectors of Factories will be available to those who apply through the Shipbuilding Employers' Federation.

Correspondence

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions

The Over Fifties

BROADCASTING the other evening, General Gough made an appeal for home defence volunteers "up to the age of fifty" and unjustified doubts seem generally prevalent as to the capacity of men who have passed the half-century to do much in the present crisis. Nevertheless, many of them are perfectly fit and are able to perform duties requiring considerable activity, especially if the work is of a kind in which they have had prevoous experience. For example, there are probably many like myself (in my middle fifties) who could be recalled to shift duties.

It seems probable that many stations normally operated on the one- or two-shift basis or closed down but not dismantled will need larger staffs for twenty-four-hour running. No doubt owing to the reduction in the number of stations in the last few years there are many younger men available with recent station experience, but I suggest that this reserve might with advantage be supplemented by experienced older men.

Again, power station operation may soon involve personal risks, and although "dug-outs" might not be well abreast of recent technical developments in their practical aspects, they would soon pick up the main threads and their experience and ability to assume responsibility in emergency would make them useful "second strings." They might also serve as understudies in lonely substations operated normally by one switchboard attendant.

NON-SENEX.

June 24th.

PERSONAL AND SOCIAL

Information regarding new appointments and other matters of interest for this page are welcomed

WE reported in our last issue the presentation made by his Fleet Street friends to **Mr. W. A. Moore,** who recently retired from the position of joint advertising manager of W. T. Henley's Telegraph Works Co., Ltd. Mr. Moore has also received further gifts. On June 13th, on behalf of the staff of the Advertising Department, Mr. J. S. Simmons, advertising manager, handed to him an expanding suitcase, and on the 18th Sir Montague Hughman, Henley's chairman, presented him with an inscribed gold repeater watch and a cheque as a token of esteem from his friends and colleagues at Henley's, including the head office, works, branches and research laboratories. Sir Montague spoke highly of Mr. Moore's services to the company and Mr. W. F. Bishop, managing director, added his tribute.

Sir Harry Brown, chairman and managing director of the British General Electric Co. Pty., Ltd. (the G.E.C.'s Australian associate) has been appointed Federal Co-ordinator of Works for the Commonwealth Loan Council, for which purpose the company is lending his services gratuitously. Sir Harry Brown was formerly the Commonwealth Director-General of Posts and Telegraphs, and on his retirement accepted the position with the company, taking over his duties on January 1st of this year. Before going to Australia in 1923 as technical adviser to the Commonwealth Government on Post Office matters he was on the staff of the British Post Office for twenty-five years. In his new appointment he will survey the works programmes of the State Governments with a view to wartime economies.

Sir Harry Brown

Mr. L. E. Harvey, technical investigation officer of the London Passenger Transport Board, is to retire at the end of the month. He has been with the Board since its formation in 1933, and before that he held positions as general tramway manager to the South Shields Corporation (1908-1912) and the Ilford Corporation (1912-1933).

Mr. J. E. Ord, manager of Rawtenstall Corporation Transport Department for six years, has resigned on superannuation through ill-health. He has been with the undertaking for over thirty years. It has been decided to advertise for a successor at a salary of £500, rising to £550 a year.

Col. H. C. Fraser has been appointed general manager of the Yorkshire Electric Power Co. and its associated companies in succession to the late Mr. W. B. Woodhouse, who occupied the position of managing director. Col. Fraser received his early training in electric traction and power station work and has been a member of the staff of the Yorkshire Electric Power Co. since 1919.

Col. H. C. Fraser, D.S.O., M.I.E.E.

During the last war he served with distinction in the King's Own Yorkshire Light Infantry. He was wounded twice, mentioned in dispatches and awarded the D.S.O. For many years he has taken a keen interest in the Territorial Army and is a member of the West Riding T.A. Association. He has commanded the 4th Battalion of the K.O.Y.L.I. and is at present hon. colonel of the battalion. He was for many years hon. secretary of the North Midland Centre of the I.E.E. and was chairman in 1935-36.

The appointment of **Mr. F. Selley** as chief electrical engineer of St. Marylebone has now been confirmed by the Borough Council. Mr. Selley was born and educated at Cheltenham, receiving training at the Polytechnic, Regent Street, and the Northampton Institute. He entered the electrical industry in 1899, serving successively with St. Pancras Borough Council, Charing Cross and City Electric Supply Co., and Walthamstow Corporation. In 1905 he joined the St. Marylebone staff, with whom he has been ever since, with the exception of a break during the last war, when he served with the Royal Navy. He is an associate member of the Institution of Electrical Engineers and is a member of Institution Rules and Regulations Committee for Electrode Boilers, and of the the Electrical Development Association Water Heating Committee. He is also the founder and one of the governors of two large ray therapy clinics.

The Electricity Committee of the Macclesfield Town Council recommends that **Mr. H. L. Howard,** who was general manager and chief engineer of the Electricity Co., of Macclesfield, Ltd., which was recently taken over by the Corporation, shall be offered "without prejudice" an annual payment of £137 10s. for life as compensation for loss of office.

Mr. L. G. Burton, Eastern Counties representative of the Midland Electric Manufacturing Co., Ltd., is now serving as a pilot officer with the R.A.F.

Mr. H. Carpenter, A.M.I.E.E., deputy electrical engineer to the Thornton Cleveleys U.D.C., has been released from his duties for the duration of the war to take up the post of temporary experimental officer with the Admiralty.

Mr. H. J. Sheppard, B.Sc., was married to Miss Joyce Brown at Darlington on June 15th. Mr. Sheppard is a district engineer with the Midland Electric Corporation for Power Distribution, Ltd., and is the immediate past chairman of the South Midland Students' Section of the I.E.E.

Sir Alexander Roger has been elected a director of the Midland Electric Corporation for Power Distribution, Ltd.

Mr. A. G. Hiscock, distribution engineer to Portsmouth Corporation Electricity Department, who has retired on superannuation, is to be re-engaged by the Corporation for a further twelve months.

Mr. J. B. Hudson, borough electrical engineer of Leigh, Lancs, has been granted an increase of salary from £750 to £800 per annum.

The appointment of **Mr. J. H. Bloomfield,** assistant mains engineer, as district manager at St. Osyth, which was recommended by Colchester Electricity Committee recently, has now been confirmed.

Mr. C. M. Shaw, who recently retired from the position of city electrical engineer at Worcester, has been presented by past and present employees of the Electricity Department with a Georgian mahogany bureau, silver sugar bowl and cream basin. Mrs. Shaw also received a Parker Knoll chair.

Mr. E. Jolly, borough electrical engineer of Bethnal Green, has been appointed deputy A.R.P. controller.

At a meeting of a special sub-committee on the reorganisation of the Glasgow Corporation Electricity Department, proposals regarding the engineering and clerical staff were approved. Among the proposals are an alteration in the salary scale for the positions of substation superintendent, power station superintendent, mains superintendent, and constructional engineer, with an increase in the maximum from £850 to £900 per annum. It is proposed that the salaries of **Mr. A. P. Robertson,** substation superintendent, and **Mr. W. Ross,** power station superintendent, shall be raised to £900 per annum, that **Mr. J. Cameron,** constructional engineer, shall be granted an increment of £60 under the new scale on July 1st, 1941, and that **Mr. H. M. Stronach,** assistant mains superintendent, shall be appointed to fill the vacancy caused by the retirement of **Mr. D. Berry** at a commencing salary of £800 per annum. It is recommended that no appointment shall be made to the position of assistant mains superintendent rendered vacant by the promotion of Mr. Stronach.

Mr. H. G. Taylor, electrical engineer to the Copper Development Association, has recently had the degree of D.Sc. conferred on him by the University of London for his published works on the subject of earthing. Mr. Taylor has read papers on this subject before the I.E.E., and has also contributed articles to the ELECTRICAL REVIEW. Before joining the Copper Development Association he was with the Electrical Research Association. He is an associate member of the I.E.E.

Mr. H. G. Taylor

The only address of **Mr. Harry Moss** after the end of this month will be 116, Horton Grange Road, Bradford (telephone: Bradford 1259).

The Southern Areas Electric Corporation, Ltd., has appointed **Mr. G. M. Daniels** as engineer and manager of the group of electric supply companies which it controls in the Home Counties and South Coast Areas.

Mr. Daniels had considerable experience of rural distribution and development in New Zealand before serving with the Expeditionary Force (1914-1918). Following two years' workshop experience of e.h.v. switchgear with Reyrolles and six years' sales development experience with the Newcastle-on-Tyne Electric Supply Co. (now the North-Eastern Electric Supply Co., Ltd.), he was appointed sales engineer to Electricity Distribution of North Wales, Ltd., in 1927. This company had just been formed to undertake the development of an area comprising approximately 1,400 sq. miles in North Wales and South Cheshire, and subsequent experience was largely of a pioneer nature.

He has been an enthusiastic supporter of E.D.A. activities, having been instrumental in forming the North Wales group, to which he acted as hon. secretary, also representing North Wales for many years on the N.W. Area Committee (Manchester), and on the Electric Vehicle Committee. Owing to ill-health he resigned in 1938 and after convalescence joined Philips Industrial, a subsidiary of Philips Lamps, Ltd., as power factor correction engineer.

Mr. Daniels is a keen golfer and will be remembered by Manchester members of the I.E.E. as the first winner of the H. H. Berry Challenge Cup (Benevolent Fund), a feat he subsequently repeated in 1936 and 1938.

Mr. J. S. Pickles, B.Sc., M.I.E.E., electrical engineer to the Dumfries County Council, has been awarded the Willans Premium by the Council of the I.E.E., for his paper dealing with the utilisation or transformation of energy treated especially from the point of view of efficiency and economy.

Mr. S. Horowitz has been appointed an additional director of the Palestine Electric Corporation, Ltd.

Will.—Mr. Herbert David Jackson, a director of George Turnock, Ltd., left £4,963 (net personalty £1,582).

ELECTRICAL IMPORTS OF MALAYA

Decline During Last Year

THE following table, which is based on official statistics recently issued in Singapore, shows the imports, by countries, of the principal electrical goods into British Malaya last year, with notes of increases or decreases compared with 1938.

	1939 $(000)	Inc. or dec. on 1938 $(000)
Automobile lamps—		
Total	18,800	− 1,100
From United Kingdom	10,700	− 2,600
„ Japan	1,700	− 2,400
Flash-lamp bulbs—		
Total	57,100	− 54,900
From United Kingdom	13,300	+ 6,500
„ United States	8,200	− 7,900
„ China	22,000	− 16,800
„ Japan	400	− 2,200
Electric hand flash lamps—		
Total	205,600	− 50,000
From United Kingdom	2,200	+ 100
„ Hong-kong	120,500	+ 32,700
„ United States	2,500	− 38,100
„ China	27,500	+ 8,600
„ Japan	52,800	+ 52,800
Other electric lamps—		
Total	320,500	− 8,500
From United Kingdom	256,000	− 39,000
„ Europe	48,000	+ 18,000
„ Japan	500	− 200
Lighting accessories and fittings—		
Total	245,000	− 51,000
From United Kingdom	220,500	− 45,500
„ Japan	1,200	− 2,100
Refrigerators—		
Total	401,000	+ 28,000
From United Kingdom	33,200	− 11,800
„ United States	368,000	+ 50,000
Fans—		
Total	208,000	+ 15,000
From United Kingdom	169,000	− 2,000
„ Italy	13,100	+ 2,100
Batteries and accumulators—		
Total	235,000	− 46,600
From United Kingdom	154,000	− 21,000
„ United States	27,000	− 16,700
Batteries for hand flash lamps—		
Total	733,000	+ 52,000
From United Kingdom	8,400	+ 200
„ British Dominions	243,000	+ 70,000
„ United States	228,000	− 24,000
Elec. instruments other than telegraph or telephone—		
Total*	94,000	− 39,000
Submarine telegraph and telephone cables—		
Total*	49,000	− 111,000
Other telegraph or telephone cables—		
Total	126,000	+ 80,400
From United Kingdom	105,000	+ 73,500
„ Belgium	16,100	+ 16,000
Other (rubber) insulated wire and cables—		
Total	624,000	− 128,000
From United Kingdom	580,000	− 141,000
„ Europe	38,000	+ 12,000
Insulated (not rubber) wire and cables, other than telegraph or telephone—		
Total*	515,000	− 96,000
Radio receiving sets, excluding valves—		
Total	432,000	+ 27,000
From United Kingdom	172,000	+ 20,000
„ Europe	150,000	+ 24,000
„ United States	121,000	− 6,000
Radio gramophones—		
Total	55,500	− 3,700
From United Kingdom	36,500	− 9,600
„ United States	16,800	+ 12,600
Radio transmitting apparatus, excluding valves—		
Total*	32,500	+ 1,900
Valves—		
Total	49,000	+ 3,000
From United Kingdom	28,700	+ 24,900
„ United States	15,500	+ 12,300
Other radio accessories and parts—		
Total	96,600	+ 16,700
From United Kingdom	48,700	+ 5,600
„ United States	35,000	+ 10,400
Telegraph and telephone instruments and apparatus, other—		
Total*	232,000	− 123,000
Electrical goods and apparatus not elsewhere specified—		
Total	799,000	− 197,000
From United Kingdom	549,000	− 196,000
„ Europe	87,000	+ 14,000
„ United States	109,000	− 27,000
„ Japan	4,100	+ 700
Transformers and convertors—		
Total*	212,000	− 352,000
Generators—		
Total	445,000	+ 100,000
From United Kingdom	420,000	+ 128,000
„ Europe	13,000	− 16,000
„ United States	11,500	− 10,500
Motors—		
Total	205,000	− 87,000
From United Kingdom	149,000	− 103,600
„ Europe	23,000	—
Switch and control gear—		
Total*	516,000	− 119,400
Electrical machinery, not elsewhere specified—		
Total	228,000	− 270,000
From United Kingdom	190,000	− 251,000
„ Europe	15,000	− 28,000

* Mainly from United Kingdom.

It will be seen that as a whole the electrical trade declined, the only noteworthy increases being in generators, refrigerators, cables (other than telegraph or telephone) and some radio apparatus.

In connection with the decline in certain machinery items it may be recalled that between 1937 and 1938 there was a rise of approximately 30 per cent. in this group.

Business generally in the Straits Settlements had not, by the end of 1939, felt much benefit from the revival in the tin and rubber industries, while some branches were handicapped by difficulties over transport and delivery in good time. In recent months speculative buying has resulted in excessive stocks of many imported articles and these, in some instances, are said to be enough for two years' normal consumption. Money has, however, been plentiful. A certain amount of private, as well as Government construction work, is planned, including the building of cheap houses in Singapore. Some American imports have been made subject to quota.

The sterling equivalent of the Straits dollar is 2s. 4d.

Japanese Electrical Trade

Continued Rise in Exports and Fall in Imports

THE Japanese Government has just published its foreign trade returns for 1939. From these the following figures, showing the imports and exports of electrical goods, have been extracted and notes of increases or decreases on 1938 added for purposes of comparison. Not much detail regarding countries of origin or destination is given.

On the export side there were substantial increases in every group except telephone instruments (other than radio) and miniature lamps, while on the import side the only noteworthy increase was in carbon for electrical use. For years the tendency has been for exports to expand and imports to shrink. The Japanese market for electrical machinery does not, however, extend far beyond the neighbouring countries of the Far East.

Japan's chief customers last year for such plant were Kwantung (20,390,000 yen), Manchukuo (9,641,000 yen), China (4,586,000 yen); for her insulated wire, Kwantung (14,766,000 yen), China (3,725,000 yen) and Manchukuo (1,345,000 yen); and for her lamps and parts thereof, Kwantung (4,018,000 yen), the United States (3,167,000 yen), China (2,546,000 yen), Manchukuo (2,032,000 yen), Dutch Indies (1,028,000 yen), British India (864,000 yen) and Great Britain (662,000 yen).

The principal suppliers of generators, transformers, etc., to Japan last year were the United States (1,764,000 yen), Germany (253,000 yen) and Switzerland (106,000 yen). [Yen=approx. 1s. 2d.]

The Japanese electrical industry has made great strides in the production of large electrical plant and 1939 was considered to be a record year in this respect. The three leading concerns were responsible for fourteen steam turbo-generator sets with an aggregate capacity of 533,000 kVA and twenty-four hydro-electric sets totalling about 505,000 kVA.

The largest set produced was a three-cylinder tandem vertical steam turbine driving a 93,750-kVA (0.8 power factor), 13,200-V alternator for the Nippon Electric Power Co., Amagasake, near Osaka. Among the hydro-electric plant were three 31,000-kVA Francis turbo-alternators supplied to the Senju station of the Railways Ministry.

EXPORTS	1939 Yen(000)	Inc. or dec. on 1938 Yen(000)
Porcelain insulators	3,077	+ 515
Porcelain switches	268	+ 166
Insulated electric wire	25,806	+ 5,919
Batteries	3,999	+ 766
Telegraphic instruments	3,128	+ 1,170
Radio receiving sets	4,200	+ 1,901
Other telephone instruments	7,302	− 442
Dynamos and motors	14,805	+ 4,449
Transformers	8,128	+ 2,111
Switchboards	3,270	+ 793
Switches	2,621	+ 398
Other electrical machinery	5,939	+ 499
Electric fans	1,355	+ 211
Miniature elec. lamps for decoration	1,720	+ 317
Miniature lamps for automobiles	154	− 132
Exports—*contd.*		
Other miniature lamps	549	− 409
Other elec. lamps not exceeding 32 c.p.	3,184	+ 661
Other elec. lamps not exceeding 100 c.p.	1,490	+ 157
Other elec. lamps	641	+ 238
Elec. flashlights	696	− 13
Sockets and shadeholders	1,132	+ 275
Metal bases for elec. lamps	255	− 68
IMPORTS		
Other insulated elec. wire	47	+ 9
Ammeters, voltmeters and volt-amp. meters	14	− 9
Imports—*contd.*		
Wattmeters	2	− 32
Batteries	26	− 19
Telegraphic instruments	529	− 1,065
Radio receiving sets	8	− 92
Other telephone instruments	1,249	− 535
Dynamos and motors weighing not more than 100 kg.	1,211	− 339
Dynamos and motors weighing not more than 5,000 kg.	324	+ 5
Other dynamos and motors	554	− 166
Transformers	96	− 81
Dynamos coupled with motive machinery	6	− 113
Carbon for electric use	1,242	+ 484

NEW ELECTRICAL PRODUCTS

A Review of Equipment Recently Marketed

Optical Pyrometer

A DISAPPEARING-filament type of optical pyrometer offered by ELLIOTT BROTHERS (LONDON), LTD., Century Works, Lewisham, S.E.13, for measuring very high temperatures, particularly in cases in which it is impracticable to employ thermo-electric pyrometers is a form of photometer using monochromatic light (usually red at a wavelength of 0.65μ). The hot object whose temperature is to be measured is observed through a telescope, its brightness being

"Siemens" optical pyrometer in use at a furnace

compared with that of a standard lamp fitted inside the telescope.

The brightness of the lamp is controlled by a variable resistance mounted on the telescope until it equals that of the heated object, the filament then appearing to melt into the background. The device functions on the balanced Wheatstone bridge principle.

The advantage of measuring the resistance of the lamp over the simpler method of measuring the current passing through it is that the whole of the indicator scale may be utilised for the useful range of temperature, *e.g.*, 700 deg. C. to 1,400 deg. C. instead of, say, 0 to 1,400 deg. C. In the latter case the portion of the scale covering 0 to 700 deg. C. is virtually wasted, as below about 700 deg. C. the brightness of the heated object is so slight that it is not practicable to make a reliable comparison. Moreover, by fixing the bridge resistance in the base of the lamp so as to form a compact lamp unit, it is possible quickly to interchange different lamp units without affecting the calibration of the indicator.

The indicator and telescope are combined in one casing and carried on a handle which contains a 2-V dry accumulator, though a terminal socket is also fitted to permit a larger or existing 2-V accumulator to be used. A range of either 800 deg. C. to 1,400 deg. C. or 1,200 deg. C. to 2,200 deg. C. can be provided, or, if preferred, the indicator can be calibrated for both ranges.

Acid Resisting Cement

A cement just brought out by J. H. SANKEY & SON, LTD., Ilford, withstands attacks by all acids, hot and cold, with the sole exception of hydrofluoric, and is useful for such applications as acid plants, tanks, &c., neutralising sumps, bonding brickwork in acid-laden soil, acid-resisting walls and floors, and jointing sewage and acid-carrying pipes or chimneys that carry acid fumes.

The cement is supplied in a fine powder and has to be mixed with Sankey's acid-resisting solution. After mixing, the cement is applied in the usual way for jointing, pointing, patching and rendering. It adheres strongly to brick, tile, earthenware, stone, concrete, iron, &c., surfaces. It takes approximately 12 hours to set to a stone or porcelain like hardness. This final hard cement is very dense and close in texture. Moreover, it has a high tensile strength and lasting waterproof properties, and remains unaffected by temperatures up to approximately 1,200 deg. C.

Anti-splinter Compound

The pasting of strips of paper or "Cellophane" on windows is one way of reducing the risk of injury that may be caused by flying glass splinters during air rads.

Another method of dealing with the situation is to apply one of the anti-splinter solutions now on the market. One of these, called the "Deloray" compound, is sold by B. BERGER & CO., LTD., 176, Albion Road, London, N.16, at a very moderate price and one gallon is sufficient to cover 500 sq. ft. of glass. The compound is either brushed or sprayed on the inside of the window and sets in about two hours, leaving the glass completely transparent. A further thin coat of glossy "Deloray" varnish is advised if it is desired to wash the windows at any time.

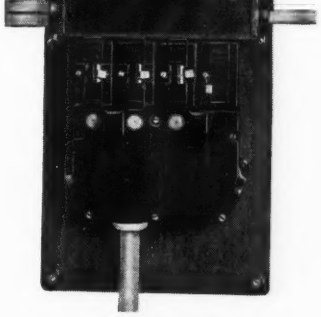
Record-changer Radiogram

The GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, announces the introduction of a record-changer version of its "BC.4058" radio-gramophone, with a powerful auto-tuned five-valve, three-waveband circuit of the superheterodyne type. The gramophone record storage space in the earlier model accommodates the automatic record-changer equipment designed to play either 10 in. or 12 in. records.

Meter Lead Shield

W. T. HENLEY'S TELEGRAPH WORKS CO., LTD., Milton Court, Westcott, Dorking, have introduced a device of interest to electricity supply undertakings which are troubled by fraudulent consumption of electricity. It is the "Isco" meter lead shield, incorporated in the "Isco" (Series 3) insulated fuse set.

The shield, which consists of a moisture-proofed fibre body held by moulded bakelite end pieces fitted with fibre diaphragms, is fitted to the plyboard by four rust-proofed wood screws, and is

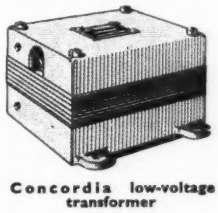


Isco meter lead shield

sealed by two tinned brass tabs. It fits snugly between the meter and the fuse set, completely protecting the meter leads from accidental damage and providing a safeguard against illegal methods of obtaining electricity.

Low-voltage Transformers

The CONCORDIA TRANSFORMER CO., 94, Railway Terrace, Rugby, which is associated with the Concordia Electric Safety Lamp Co., Ltd., is now producing an extensive range of low-voltage transformers, chokes, small condensers, &c., suitable for a variety of purposes.

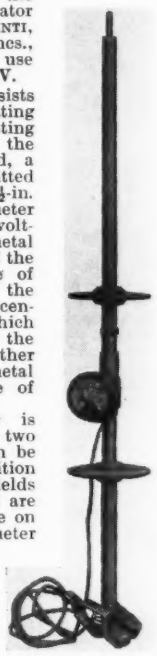


Concordia low-voltage transformer

The transformer illustrated is a sample unit, which is made to B.S.S. 794, designed to transform from 230 V to 12, 24 or 25 V, the extra volt over the 24 V being obtained by means of an adjustment of 5 per cent. in the primary voltage. Provision is made for $\frac{3}{4}$in. conduit entry and exit and there are four substantial lugs for wall or base mounting. The unit is housed in a substantial casting.

High Voltage Indicator

The latest model of the high-voltage indicator brought out by FERRANTI, LTD., Hollinwood, Lancs., has been designed for use on systems up to 11 kV.



Ferranti Model No. 1 high-voltage indicator

The apparatus consists of a tube of insulating material with a testing spike for applying to the conductor to be tested, a concentric condenser fitted over the tube and a 2½-in. dial electrostatic voltmeter calibrated to read the voltage to earth. The metal spike extends a part of the way down the centre of the tube and forms the centreplate of the concentric condenser, of which the insulated tube is the dielectric and the other plate is a sliding metal collar on the outside of the tube.

The sliding collar is free to move between two limiting stops and can be clamped in position against either. Two shields of insulating material are fitted on the stick, one on each side of the voltmeter and sliding condenser. A 6-ft. long earthing lead is provided and for convenience in handling a non-slip rubber grip is fitted over the handle of the apparatus, a leather loop being provided for hanging it up when it is not required.

The electrostatic voltmeter has two boldly marked scales reading up to 5 and 10 kV respectively, according to the setting of the condenser. One terminal is connected to the sliding collar of the condenser and the other to the earthing lead.

The instrument is calibrated to suit plied, and it is mounted in such a manner that its position can be adjusted to facilitate readings at various angles. Accuracy is within approximately ± 5 per cent. The overall length of the apparatus is 2 ft. 10½ in. and its weight about 3½ lb.

Ceramic-embedded Resistors

Special features of the "Ceramite" embedded resistor, made by the ZENITH ELECTRIC CO., LTD., Zenith Works, Villiers Road, Willesden Green, N.W.2, are their reliability; stability; proof against oil, steam, acid and alkali; "non-crazing" and non-hygroscopic qualities; high overload capacity; exceptional insulation; and suitability for tropical service.

The enclosing tube is capable of supporting considerable thermal shock combined with great density of structure, so that it is itself quite impervious to moisture, even under considerable pressure. The windings consist of high-grade alloys complying with B.S.S. 115 and the winding machines ensure great uniformity of tension and spacing throughout. Special treatment removes all stress and secures permanency of the ohmic value.

The embedding process consists of the application of a ceramic material, which is subsequently fused in special furnaces, so that it flows into and over the winding and surface of the body tube. On cooling it attains a tough glass-hard substance and finish, with a highly glazed surface immune to all "crazing" or damage by attack of moisture, steam, oil, acids or alkalis. This firing process is carried out under conditions which preclude any deleterious corrosion of the resistor winding.

COMMERCIAL and INDUSTRIAL NEWS

Restriction of Supplies. Overseas Trade in May. Birmingham Vehicle Exhibition

Limitation of Supplies

TRADE organisations have had so many inquiries regarding the Limitation of Supplies (Miscellaneous) Order (see ELECTRICAL REVIEW, June 14th, p. 638) that the registration of many manufacturers and traders has been delayed. The Board of Trade has therefore extended the period for registration to June 30th.

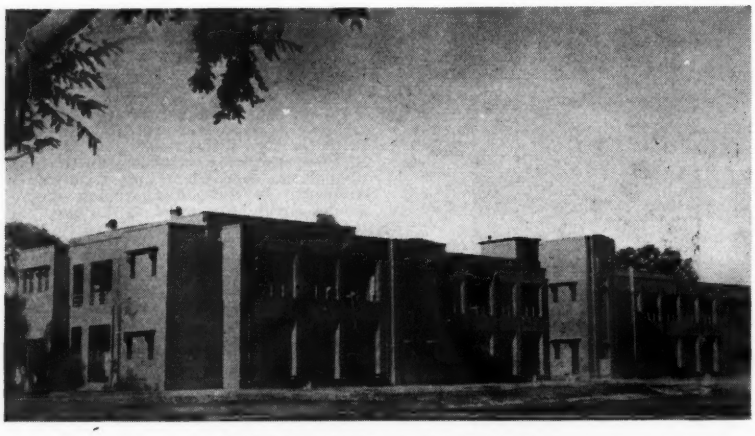
The Board has also decided that where supplies of controlled goods are invoiced to a registered person who is acting in the capacity of an agent either of the buyer or of the seller, the goods are to be regarded as supplied to the agent, and the agent will in turn be held to have supplied the goods to the buyer. The agent will therefore be responsible for restricting such supplies in the same manner as those which he makes as a principal.

Goods supplied on hire or hire-purchase are subject to the restrictions if they are scheduled as controlled goods. Where the same goods are supplied by the same person on more than one occasion their value will be taken into account only on the occasion when they are first supplied during the relevant period. The value to be taken into account is the sale value, not the price paid for their hire.

Auctioneers, pawnbrokers, hire-purchase financing houses and insurance companies will not be deemed to be carrying on the business of wholesale dealers in controlled goods. The Order is commented upon in a leaderette.

Up-to-Date Indian Hospital

At the North Western Railway Hospital recently completed at Lahore, the electric wiring installation was carried out by the Russa Engineering Co., Lahore, who used some 6,200 yards of Henley tough-rubber-sheathed cables for connections to the various lighting, fan, plug points, &c. Most of the wiring was installed on the surface on teak-wood strips, but in certain rooms, including the operating theatre, chases were cut in the walls, lined with cement and finally plastered over to conceal the wiring.



The North Western Railway Hospital, Lahore

War-time Industrial Lighting

Owing to the vital need for improved industrial output the E.D.A. South East and East England Area, in conjunction with the E.L.M.A. Lighting Service Bureau, is continuing the Factory Lighting Campaign. In this connection twenty County of London Electric Supply Co. consumers and staff visited the E.L.M.A. Lighting Service Bureau on June 18th. The party was welcomed on behalf of the Better Light—Better Sight Committee by Mr. E. B. Sawyer, who stated that the meeting had been arranged in order to show factory executives ways and means of providing adequate lighting to meet the present demands for increased production.

The first lecture, "Recent Developments in Electric Lamps," surveyed progress from the tungsten vacuum lamp to the new tubular fluorescent lamp. The lecturer, Mr. R. Pelerin, described the characteristics of the ranges of tungsten filament and electric discharge lamps available for industrial lighting, and concluded by demonstrating the major features and advantages of the new fluorescent tubular lamp.

The second lecture, "Wartime Factory Lighting," was given by Mr. N. I. B. Harrison, who said that the need for good industrial lighting was greater today than it had ever been. Large numbers of factories were now working twenty-four hours a day at many times normal pressure. The operative must be able to see properly and quickly, and it was the duty of industrial concerns to provide adequate lighting to meet his requirements. Mr. Harrison gave results of tests proving that good lighting speeded up production, and then demonstrated various systems of industrial lighting. After discussion, the meeting terminated by a vote of thanks to the lecturers.

Mr. Harrison is to lecture on these subjects at Electricity House, 9-15, Pier Road, Erith, on July 8th, at 6.30 p.m., especially for the benefit of factory managers, works engineers and other officials.

Chief engineers and managers of undertakings with important industries in their areas are invited to get in touch with the Area Officer, S.E. and East England Area, 2, Savoy Hill, W.C.2, with a view to arranging similar lectures.

Overseas Electrical Trade

Surveying Great Britain's overseas trade in May, the *Board of Trade Journal* points out that both imports and exports were affected throughout the month by the drastic reduction in trade with Scandinavia and the Baltic countries, and for a great part of the month by the invasion of the Low Countries. The excess of imports over exports was roughly the same as in April. With regard to electrical equipment, however, the position shows considerable improvement. Exports went further ahead from April's record total of £1,356,688 to £1,477,336, which compares with £1,106,696 in the corresponding month of last year. On the other hand, imports were drastically curtailed, dropping from £485,917 in April to £268,521 in May. Thus the favourable balance of exports over imports rose during the month from £870,771 to £1,208,815.

Emergency Mains Excavation

The maintenance of electricity supplies in emergencies, such as an air raid, will be helped by equipment that can be instantly rushed to the site of damage and put into operation without delay. The "S6" type heavy-duty road breaker manufactured by Warsop Petrol Drill & Tools, Ltd., 27, Regent Street, S.W.1, is really portable and can often be used when it may be uneconomical and impracticable to transport compressor units over fallen debris. The machine is completely self-contained. A two-stroke petrol engine is mounted in an inverted position in the head of the machine and below the engine piston is the hammer piston which works in the opposite direction to, but is not in metallic contact with, the engine piston. The explosion takes place between these two pistons, driving them apart, the hammer piston being returned by exhaust gases which are diverted through a control port in the cylinder. The power of the engine is thus directly applied to the breaking steel.

New Zealand Customs Decisions

The *Board of Trade Journal* reports a number of decisions of the New Zealand Customs Department with regard to the classification of various articles under the Customs Tariff. Among them are various kinds of battery boxes and cases which are admitted free of duty under the British preferential tariff and are subject to a 40 per cent. duty under the general tariff; batteries for miners' lamps, imported separately (15 per cent. and 40 per cent.); electric irons, castings and stampings, rough, machined, finished or partly finished (20 per cent. and 50 per cent.); toasters, castings and stampings (20 per cent. and 45 per cent.).

Industrial Jobs for War-Blinded

Hitherto the activities of blinded ex-Service men of the last war have not usually extended beyond the professions, business and minor handicrafts. Records, however, have shown that a blinded man can operate an automatic, or semi-automatic machine, with dexterity and efficiency. At a private luncheon last week a Research Advisory Committee of St. Dunstan's was formed, with Major Astor, M.P., as chairman, and including Lord Nuffield, Lord McGowan, Sir Kenneth Lee, and Sir Ian Fraser, M.P. (chairman of St. Dunstan's). The primary function of the Committee will be to enable officials of St. Dunstan's and the London School of Hygiene to investigate and, if necessary, experiment on the possibilities of blinded men working on machines.

Birmingham Electric Vehicle Exhibition

An exhibition of electric vehicles organised by the Electric Vehicle Association was held at the Colmore Depôt, John Bright Street, Birmingham, on June 26th and 27th, and was officially opened by Alderman Sir Percival Bower, chairman of the Birmingham Corporation Electricity Committee. The exhibitors taking part included Associated Electric Vehicle Manufacturers, Ltd.; Cleco Electric Industries, Ltd.; Midland Vehicles, Ltd.; Metropolitan-Vickers Electrical Co., Ltd.; Partridge Wilson & Co., Ltd., and T. H. Lewis, Ltd. Battery manufacturers were represented by D.P. Battery Co., Ltd.; Chloride Electrical Storage Co., Ltd.; Tudor Accumulator Co., Ltd.; Young Accumulator Co., Ltd., and Britannia Batteries, Ltd. The Westinghouse Brake & Signal Co., Ltd., displayed a charger.

Orders for Periodicals

In the present circumstances it will be of great assistance to newsagents if their customers will give them two weeks' notice if they wish to stop the delivery of periodicals during a temporary absence from home, and also give due notice when they wish delivery to be resumed.

Fatalities

On June 19th an inquest was held at Billericay (Essex) into the death of Frank H. Bird, of Laindon. A witness stated that Bird was working on a grinding machine when he shouted and collapsed with one hand on the machine. The managing director of the deceased's firm said that the machine was clamped in a vice on a bench which was enclosed with wire mesh and partitioned off. The machine was connected to a lampholder by a rubber-covered cable with a switch, and the earth lead was taken to the frame of the building.

A police constable stated that he found the earth wire disconnected; strands of the live wire of the flex were making contact with the earth terminal. A works electrician said that the machine had never given trouble and he had had no occasion to examine the switch. The defect could only have been detected by internal examination. A verdict of "Accidental death" was returned.

Last week a youth at Cricklewood was arranging some wiring in an air-raid shelter when he received a fatal shock.

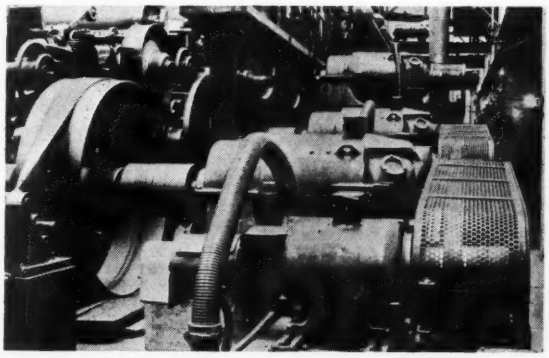
An inquest was held recently at Wallington, Surrey, on a two-year-old boy who received a fatal shock from a wall point at his home at Caterham.

The child's father said that at teatime he went to pick the boy up from the floor as he had not responded when called, and received a severe electric shock. A tiny skewer used for pinning labels on meat was in the child's hand, which was blistered. Apparently he had pushed the skewer into the wall point which had been fitted with a blank plug, but this was removed as the child often played with it. He applied artificial respiration without avail. Dr. A. Reeves Heber said that the child was dead when he arrived, death being due to electric shock.

The coroner, recording a verdict of "Misadventure," said it was unfortunate that some steps were not taken to ensure that the current could be turned off at that point.

Southend Employees' Superanuation Rights

The electrical engineer recently reported to Southend-on-Sea Electricity Committee that it would be necessary at an early date to effect some further reductions in the staff. The Committee decided that the matter should be deferred until its next meeting, and the engineer was asked to furnish details of the employees affected. As many of those already discharged, and others likely to be, were in established posts, the Committee felt that the Establishment Committee should be asked to consider whether it was possible for steps to be taken to safeguard the position of the men so far as their superannuation rights were concerned, in view of the fact that their discharge was due entirely to conditions brought about by the war.



First press section of a paper machine with BTH power selsyn, coupled through belt and cone drive

Glasgow Corporation and Building Contracts

A special sub-committee on contracts affected by war conditions appointed by Glasgow Corporation has agreed to receive a deputation from the Scottish National Building Trades Federation (Employers) (including electrical contractors) with reference to a suggested general agreement regarding contracts.

Prices of Materials

Henry Gardner & Co., Ltd., report, June 26th: Mercury, £53 18s. 6d. to £57. English block tin, £266 10s.

No change in the price of india-rubber. Para fine, is reported by Edward Till & Co.

Trolley-Bus Order

The Wolverhampton Corporation Transport Department has placed a further order with Sunbeam Commercial Vehicles, Ltd., for ten Sunbeam-B.T.H. chassis of the "M.F.2" four-wheel type. This is the twelfth repeat order Wolverhampton has placed with the Sunbeam Co. since the first vehicles were supplied some nine years ago.

Employment in May

There was an expansion of employment in all sections of the engineering industry in practically all districts between April 15th and May 20th. According to the *Ministry of Labour Gazette*, the number unemployed in the electrical engineering industry was 1,963, or 1.6 per cent., being a fall of 0.2 per cent. as compared with the previous month, and of 2.4 per cent. as compared with May, 1939.

In the electrical wiring and contracting industry the total out of work was 1,970, the percentage falling from 5.6 to 4.6 (9.3 per cent. in May, 1939). Unemployed in the electric cable, apparatus, lamps, &c., group totalled 6,204, or 3.3 per cent., showing a decrease of 0.4 per cent., as compared with the preceding month, and of 3 per cent. as compared with May, 1939.

Smuggled Batteries

At Newry (Co. Down) last week Owen Toner was charged with smuggling a large quantity of batteries and battery lamps from Eire into Northern Ireland. He was fined £600 with the alternative of six months' imprisonment. Bail was fixed at £1,200 pending an appeal against the conviction.

Electric Drive for Paper Mills

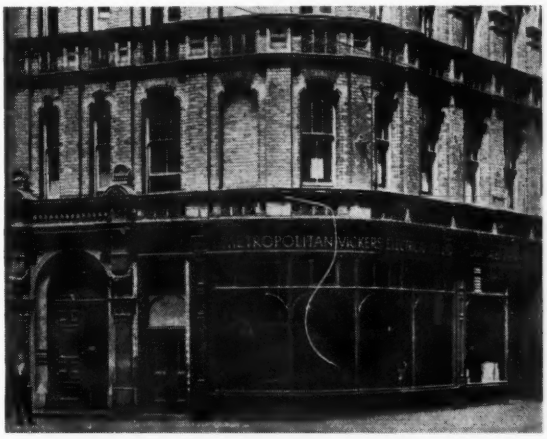
Among the developments of the British Thomson-Houston Co., Ltd., during the last few months is an AC multi-motor drive for a paper machine in which selsyns are employed for regulating the speeds of the section driving motors. The driving motors are three-phase AC commutator-type machines, and the regulating system gives extremely close speed regulation of the various sections, the accuracy of the control being well within that demanded by the quality of the product manufactured on the machine.

A similar drive of particular interest consists of five sections. One of these sections is the master and has the master selsyn driven through gearing from the main section motor. The speeds of the other four sections are governed by this master selsyn through the agency of the differential selsyns which cause the brushgear selsyn to move the brushgear in the appropriate direction during speed change, and to give regulating movement during steady running conditions. On all sections except the master a variable speed is fitted between the section motor and the differential selsyn. This gear gives means of providing "draw adjustment," the ratio of the gear fixing the speed of the section driving motor relative to the speed of the master selsyn. This drive has to operate in a chemically impure atmosphere and special arrangements have been devised to supply air under pressure to the whole of the equipment.

Other B.T.H. work for paper mills includes motors totalling 7,200 HP and their associated control gear for use with wood grinders in Australia; and a drive for a friction calender employing two variable speed AC commutator motors running in parallel, one driving the top and the other the bottom roll.

The Co-operative Lampworks

The British Luma Electric Lamp Society, formed by the Scottish and Swedish Co-operative Wholesale Societies, commenced operations just before the war started. There immediately arose difficulties in obtaining the necessary raw materials and the managing director returned to Sweden. The *Co-operative News* reports Mr. N. S. Beaton, president of the Scottish C.W.S., as giving this explanation of a loss incurred by the Luma concern at a recent meeting. He also said that the expenditure in the first year could be regarded in the nature of development charges.



The new branch lamp sales department which has recently been opened in Liverpool by the Metropolitan-Vickers Electrical Co., Ltd.

Several delegates at the meeting expressed concern at the size of the loss, but Mr. Beaton was confident of the factory's future. Large orders were being received and a profit was now being shown. Only a quarter of the trade was included in the figures; lamps were put into stock before selling began. Retail societies in Great Britain were giving the factory excellent support.

Trade Announcements

Aberdare Cables, Ltd., have appointed as their sole agent for Eire Mr. T. J. Horgan, B.E., B.Sc., 30, Haddington Road, Dublin, for the sale of p.i.l.c. and armoured cables.

The Lighting, Heating & Traction Supplies Co., Ltd., has removed to 88, Bridle Road, Eastcote, Pinner, Middlesex (telephone: Pinner 3346).

Mr. G. M. Nachimson informs us that he has commenced the manufacture of micanite insulation of all descriptions at 148, Upper Elmers End Road, Beckenham, Kent. (Telephone: Beckenham 5257).

New Catalogues and Lists

Midland Iron & Hardware Co. (Cradley Heath), Ltd., Cradley Heath, Staffs.—A circular relating to new and reconditioned valves for steam, water, gas and air.

Latem Electrical Co., Eastwood Street, Hall Lane, Bradford.—A leaflet illustrating and describing the company's lamp for lighting shelters, etc.

W. Edwards & Co. (London), Ltd.—Details of new all-metal water jet pumps of improved design.

B.E.N. Patents, Ltd., High Wycombe, Bucks.—A 40-page catalogue embodying technical data, illustrations and full details of B.E.N. air compressors, spray painting equipment, compressed air fittings, equipment and tools.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, &c., are replied to by our Information Department, through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:

DYNAMETER valve tester.

Mercury pool rectifier; capacity 100 A. Supply available 380/400 V three-phase.

ELECTRICITY SUPPLY

Continuation of Grampian Power Schemes. London Electricity Charges.

Billinge.—SUPPLY TO WINSTANLEY.—The Urban District Council is approaching the Wigan Corporation with regard to an extension of the electricity supply to Winstanley.

Carlisle.—LOAN SANCTIONS.—The Electricity Committee has obtained sanction to borrow £1,553 for mains and £900 for substation equipment.

Clitheroe.—UNDERTAKING'S PROFIT.—At last week's meeting of the Town Council it was reported that the Electricity Department's profit for the past year was £1,384, a reduction of £1,700 compared with 1938-39.

Cranbrook (Kent). — PROPOSED SUBSTATION.—The Rural District Council has approved plans for the erection of a substation for the Weald Electricity Supply Co., Ltd.

Croydon. — LOANS. — The Electricity Committee has obtained permission to borrow £41,924 for mains and £8,516 for substations.

Darlington.—CHANGE-OVER. — Sanction has been received by the Town Council to borrow £2,166 in connection with the change-over of supply in the Cleveland Terrace area and it has been decided to proceed with this section of the work.

Dumfries.—HIRE TERMS.—An increase in the hire charge for storage water-heaters of 1s. per quarter, with the addition of a first payment of 5s. in the case of 1½- and 3-gal. heaters and 10s. for sizes above 3 gal. in all cases where the wiring and plumbing are included in the transaction, has been authorised by the Town Council. The hire facility for wash-boilers is being withdrawn in favour of a three-year hire-purchase scheme, including free maintenance during the period of the agreement.

SPECIAL ORDER APPLICATION.—A report by the manager of the Electricity Department in connection with an application for a Special Order to supply new area comprised within the recent extension of the burgh boundary is being forwarded to the Electricity Commissioners.

Glasgow.—UTILISATION OF ESTIMATED SURPLUS.—The Town Clerk has reported to the Electricity Committee that the consent of the Electricity Commissioners has now been obtained to capital expenditure amounting to £42,000 being met out of the estimated surplus revenue of the Electricity Department for the year ending May 31st, 1941.

Grampians.—WORK ON POWER SCHEMES.—Major McCallum asked the Minister of Transport in the House of Commons on June 19th why the Grampian Electric Supply Co. was allowed to continue work on its extensive schemes in the districts of Dalwhinnie and Laggan, having regard to the length of time that must elapse before those schemes became productive, the large number of skilled men employed, the quantity of material used and the need for skilled men and material in the production of munitions. Mr. F. Montague, who replied, said that the Minister had looked into this matter and was satisfied that the work was fully justified.

Gravesend. — WATER-HEATER HIRE CHARGES.—The Electricity Committee proposes to increase the charge for the hire of 1½-gal. water heaters from 1s. 6d. to 2s. a quarter and of 15-gal. heaters from 10s. to 12s.

Hoylake.—PRICE ADVANCE.—Last week the Urban District Council decided to increase both gas and electricity charges by 5 per cent. as from July 1st.

Lichfield.—PROPOSED ELECTRICAL INSTALLATIONS.—It was reported at the last meeting of the City Council that the electrical engineer had arranged terms with the Hayes Bridge Estate for the extension of the mains to 50 houses and the provision of a cooker and wash-boiler in each house. The Rural District Council has also accepted a quotation for the extension of the mains to 16 houses.

Llanfairfechan. — INCREASED COOKING AND HEATING CHARGES.—The Urban District Council has decided to increase its domestic heating and cooking charges. From the beginning of the September quarter the tariff will be :—First 50 kWh, 3d. per kWh (instead of 2d.); 50-100 kWh, 2d. per kWh (instead of 1d.); all in excess, 1d. per kWh. There will be no increase in the charge for lighting.

London.—ELECTRICITY CHARGES.—In the House of Commons on June 18th Sir Thomas Moore asked the Minister of Transport what steps he proposed to take to prevent the charges for electricity in London becoming steadily higher as the number of consumers became steadily lower. Sir John Reith said that the position in the Central London area was being further reviewed by the Electricity Commissioners at the end of this month, when the point raised would be fully considered.

HAMMERSMITH.—The Electricity Commissioners have sanctioned the borrowing by the Council for the electricity undertaking of the sum of £27,517 in respect of an application for £39,057 for unspecified works.

HACKNEY.—The Electricity Committee has obtained sanction to a loan of £5,000 for wiring installations.

ST. PANCRAS.—In connection with the electricity supply to the L.N.E.R. it is proposed to replace switches of 100,000 kVA rupturing capacity by others of 250,000 and 150,000 kVA at an estimated cost of £2,650, half of which is to be borne by the Company.

STEPNEY.—The Electricity Supply Committee reported to the Council on Wednesday that the output for the year ended March 31st last was 118.8 million kWh, as compared with 127.6 million kWh in the previous year, a reduction of 6.9 per cent.

STOKE NEWINGTON.—It is proposed to charge an all-in rate of 1d. per kWh for supplies to wardens' posts.

Mold.—PRICE INCREASES.—The following increases in electricity charges have recently been confirmed by the Urban District Council : Lighting, ¼d. per kWh; power, ¼d.; "all in" tariff, ⅛d. The special discount has been discontinued.

Queensbury and Shelf.—CRITICISM OF COMPANY'S TERMS.—At the last meeting of the Urban District Council mention was made of difficulties about the completion of Shelf bungalows, through the delay in installing electricity, it being asserted that tenants were unable to take possession, the Council thereby losing rent. The clerk read a letter from the Yorkshire Electric Power Co. stating that electricity would be put in at a charge of £2 per house, and a resolution was passed that the Council accept the terms under protest.

Rawtenstall.—HIGHER CHARGES. — The Council has decided to increase electricity charges for lighting, heating and domestic use by 7½ per cent. as from July 1st.

Rushden.—MODIFIED LIGHTING. — The Urban District Council is to adopt a scheme of general street lighting on the approved wartime scale.

Swansea.—POWER STATION EXTENSION.—The Borough Council on Wednesday last week approved a resolution to extend the power station by the erection, installation and completion, ready for commercial operation in September, 1942, of one turbo-alternator set having a maximum continuous rating of 37,500 kW and two boiler units each having a maximum continuous evaporative capacity of 230,000lb. of steam per hour, complete with the necessary ancillary plant. The estimated cost is £830,000 and application is to be made for loan sanction for this amount. The Central Electricity Board, it was stated, considers the extension desirable.

Tow Law.—NEGOTIATIONS WITH COMPANY.—It was reported at a meeting of the Council that the North Eastern Electric Supply Co. had not agreed to install electricity on the hired wiring system, and it was decided to communicate with the Company again.

Tynemouth. — CONTRACTORS AND INCREASED COSTS.—Local electrical contractors recently intimated that owing to increased cost of materials, &c., work under the Electricity Department's assisted wiring scheme could only be undertaken at an increase of 30 per cent. on existing prices and that in the event of further increases in costs the charge would be advanced accordingly. After considering the matter the Electricity Committee decided that quotations should be invited as and when such installations were required.

Weymouth.—PURCHASE OF METERS.—The Electricity Committee has obtained sanction to utilise £4,000 from the renewals fund for meters.

SUBSTATION INTERCONNECTION.—Sanction has been obtained to borrow £2,425 for cable and plant for the interconnection of substations.

TRANSPORT

Hastings.—NEW DOUBLE-DECK TROLLEY-BUSES.—The first ten of the 20 A.E.C.-English Electric double-deck trolley-

A new Hastings double-deck trolley-bus passing one of the single-deckers which are being superseded

buses which have been acquired by the Hastings Tramways Co. are now going into operation. Hitherto only single-deck vehicles and a small number of open-top double-deckers have been employed, but these are now proving insufficient for the needs of the district. The change-over from one type to the other will be completed when the 28 additional A.E.C.-English Electric double-deckers now under construction have been delivered.

The new vehicles have chassis constructed to the revised M.O.T. regulations affecting ground clearance and 54-seater bodies of the most modern type. The bodies, of which half are of M.C.W. composite construction, are to the particular design of Mr. G. F. French, director and general manager of the Hastings Tramways Co., and embody many ideas which his experience, gained in the operation of three companies, has shown to be advantageous. The overall height has been brought down to 15ft. 2in., which gives a clearance of 8in. under the lowest bridge on the system. Floor height is finally determined by the position of the axle casing, and in the latest A.E.C. chassis this component has been kept clear of the gangway by the use of a special oblique 8½in. centre worm gear. This is offset at the nearside to line up with the motor which is inclined at an angle of 3 deg., a form of design that permits the adoption of a straight line drive.

The Hastings system, which serves also the Borough of Bexhill, has a route mileage of 29 and comprises 12 services, including a circular run some 15 miles in length. Routes running to the east and north-east of the town rise very steeply and include gradients of 1 in 9 and 1 in 10. Recently two new substations have been erected and seven are now in operation, power being taken from the grid. The overhead equipment has also been improved.

NEW PATENTS

Electrical Specifications Recently Published

Compiled by a firm of chartered patent agents. The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1938

12314. "Deflection of cathode-ray beams." Radioakt. Ges. D. S. Loewe. April 26th, 1937. (Addition to 423427.) (521637.)

28415. "Automatic control apparatus operated by temperature or other variable." A. G. Lobley, Birmingham Electric Furnaces, Ltd., C. A. F. Fennell, and Foster Instrument Co., Ltd. September 30th, 1938. (521793.)

29980. "Deflection of cathode-ray beams." Radioakt. Ges. D. S. Loewe. October 20th, 1937. (Addition to 423427 and 521637.) (521638.)

30210. "Electric signal transmission systems." J. Collard. October 19th, 1938. (521744.)

30756. "Electric motor control systems." General Electric Co., Ltd., and H. J. Coates. October 25th, 1938. (521747.)

31331. "Luminescent materials for electric-discharge lamps." British Thomson-Houston Co., Ltd. October 30th, 1937. (521796.)

33947. "Remote-control systems, particularly for radio receivers." Kolster-Brandes, Ltd., and J. Arnold. November 22nd, 1938. (521710.)

33948. "Antenna systems and supporting structures." Kolster-Brandes, Ltd., and W. A. Beatty. November 22nd, 1938. (521711.)

33950. "Electric communication cables." Standard Telephones & Cables, Ltd., E. Baguley and J. R. Vezey. November 22nd, 1938. (521712.)

33951. "Electro-magnetic relay switching devices, particularly for radio equipments." Standard Telephones & Cables, Ltd., R. G. St. Terry, and J. R. Beard. November 22nd, 1938. (521713.)

33952. "Current-limiting arrangements for indirectly heated valves." Standard Telephones & Cables, Ltd., F. G. Filby. November 22nd, 1938. (521714.)

33955. "Incandescent-filament electric lamps." H. Mayer. November 22nd, 1938. (521643.)

33978. "Gas- or vapour-filled electric-discharge devices." Patentverwertungs Ges. Hermes. November 22nd, 1937. (521717.)

34095. "Apparatus for the production of electric oscillations." Westinghouse Brake & Signal Co., Ltd., S. A. Stevens, and A. H. B. Walker. November 23rd, 1938. (521719.)

34096. "Apparatus for amplifying alternating or pulsating electric currents." November 23rd, 1938. Westinghouse Brake & Signal Co., Ltd., and S. A. Stevens, and A. H. B. Walker. (521798.)

34158. "Brakes for electrically propelled vehicles." Sunbeam Commercial Vehicles, Ltd., H. G. Harwood. November 24th, 1938. (521649.)

34164/34165. "Carrier-wave signalling systems." Wired Radio, Inc. December 21st, 1937. (521720/521721.)

34167. "Electric communication cables." Standard Telephones & Cables, Ltd., E. Baguley, R. J. Vezey, R. L. Hughes, and D. P. Dalzell. November 24th, 1938. (521801.)

34170. "Pole-pieces for moving coil electric measuring instruments." H. T. Pasmore, and Automatic Coil Winder & Electrical Equipment Co., Ltd. November 24th, 1938. (521654.)

34190. "Apparatus for coating the inner surface of a tube with powdered material." General Electric Co., Ltd. (Patent-Treuhand Ges. für Elektrische Glühlampen.) November 24th, 1938. (521659.)

34206. "Furnaces." J. MacDonald, and G.W.B. Electric Furnaces, Ltd. November 24th, 1938. (521661.)

34208. "Resistance electric welding-machines." British Thomson-Houston Co., Ltd. November 24th, 1937. (521662.)

34210. "Speed-control systems for direct-current electric motors." British Thomson-Houston Co., Ltd. November 24th, 1937. (521663.)

34211. "Telephone or like systems." Automatic Telephone & Electric Co., Ltd., and H. E. Hopley. November 24th, 1938. (521,802.)

34214. "Cathode-ray tubes." Fernseh Akt. Ges. November 24th, 1937. (521803.)

34221. "Holders, particularly for arc-lamp electrodes." A. Stahn. November 24th, 1938. (521667.)

34251. "Rotary electrical transformers of the kind shown as metadyne transformers." H. Newsam, A. Tustin, and Metropolitan-Vickers Electrical Co., Ltd. November 24th, 1938. (521675.)

34330. "Control and protective systems for electrical apparatus." A. Reyrolle & Co., Ltd., and J. Tiplady. November 25th, 1938. (521807.)

34331. "Loudspeakers of the electro-dynamic type, and methods of assembly thereof." Philco Radio & Television Corporation. December 15th, 1937. (521808.)

34332. "Method of assembling and welding loudspeaker parts." Philco Radio & Television Corporation. December 15th, 1937. (521809.)

34333. "Sound-reproducing devices." Philco Radio & Television Corporation. December 14th, 1937. (521810.)

34334. "Loudspeakers." Philco Radio & Television Corporation. December 14th, 1937. (521811.)

34335. "Control device for radio receivers and the like." Philco Radio & Television Corporation. December 13th, 1937. (521812.)

34350. "Control systems for electrical apparatus." A. Reyrolle & Co., Ltd., and J. Tiplady. November 25th, 1938. (521729.)

34351. "Control and protective systems for electrical apparatus." A. Reyrolle & Co., Ltd., and J. Tiplady. November 25th, 1938. (521730.)

34353. "Electron-discharge devices." Standard Telephones & Cables, Ltd., and T. C. Black. November 25th, 1938. (521813.)

34356. "Television time bases and like apparatus." Kolster-Brandes, Ltd., and W. A. Beatty. November 25th, 1938. (521814.)

34359. "Electrically operated indicating devices." Standard Telephones & Cables, Ltd. (W. Hatton). November 25th, 1938. (521760.)

34374. "Electric frequency-changing circuits and multi-electrode thermionic valves." M-O Valve Co., Ltd., R. J. Ballantine, and E. G. James. November 25th, 1938. (521762.)

34375. "Metal-vapour charge devices." General Electric Co., Ltd., and D. G. Prinz. November 25th, 1938. (521763.)

34405. "Coating of articles with metallic layer by cathode disintegration." B. Berghaus. November 30th, 1937. (521768.)

34429. "Voltaic gas cell." M. Tanferna. November 30th, 1937. (521773.)

34433. "Silver alloys, and electrical contacts comprising such alloys." Mallory Metallurgical Products, Ltd. (P. R. Mallory & Co., Inc.). November 25th, 1938. (Cognate application 7877/39.) (521774.)

34448. "Push-button mechanisms for tuning radio receivers." C. Metcalfe and H. J. Parrish. November 26th, 1938. (521817.)

34451. "Synchronisation of clocks." F. Hope-Jones. November 26th, 1938. (521775.)

34472. "Thermionic electrodes for electric-discharge devices." British Thomson-Houston Co., Ltd. November 26th, 1937. (521850.)

34473. Electromagnetic devices for imparting movements to lamps." British Thomson-Houston Co., Ltd. November 26th, 1937. (521851.)

34482. "Apparatus for the reversal of pictures by an electrical process." I.G. Farbenindustrie Akt.-Ges. November 29th, 1937. (521853.)

34533. "Ironless induction furnaces." Heraeus-Vacuumschmelze Akt.-Ges. November 27th, 1937. (521858.)

34542. "Vacuum tubes." Marconi's Wireless Telegraph Co., Ltd. November 27th, 1937. (521818.)

34556. "Ignition magnetos." J. Lucas, Ltd., and W. H. Burgess. November 28th, 1938. (521859.)

34582. "Hand-actuating means for electric switches." E. A. Bellow. November 28th, 1938. (Cognate application 2584/39.) (521777.)

34598. "Liquid-break electric circuit-breakers." British Thomson-Houston Co., Ltd., H. E. Cox and T. W. Wilcox. November 28th, 1938. (521861.)

34635. "Variable inductances for tuning high-frequency resonant circuits." Johnson Laboratories, Inc. November 26th, 1937. (521862.)

34641. "Electric switches or cut-outs." Elexcel, Ltd., and W. G. Harford. November 28th, 1938. (521864.)

34662. "Electricity meters." R. H. Gould. November 27th, 1937. (521780.)

34673. "Lampholders for electric light." S. J. Jacks. November 29th, 1938. (521823.)

34751. "Electro-mechanical brakes." E. R. Elliston. November 29th, 1938. (521825.)

34769. "Thermionic valve circuits." Kolster-Brandes, Ltd., and C. E. Brigham. November 29th, 1938. (521872.)

34770. "Television and picture-transmission systems." Kolster-Brandes, Ltd., and W. A. Beatty. November 29th, 1938. (521873.)

34775. "Electrical condensers." Standard Telephones & Cables, Ltd., and J. C. Edwards. November 29th, 1938. (521874.)

34788. "Electrical rectifiers." Westinghouse Brake & Signal Co., Ltd. August 17th, 1938. (521827.)

34799. "Voltage-regulating apparatus." C. G. Mayo and H. S. Walker. November 29th, 1938. (521828.)

34862. "High-tension ignition coils for internal-combustion engines." J. Lucas, Ltd., and E. A. Watson. November 30th, 1938. (521877.)

34863. "Spark-ignition systems for internal-combustion engines." J. Lucas, Ltd., and E. A. Watson. November 30th, 1938. (521878.)

34909. "Telephone systems." Associated Electric Laboratories, Inc. December 10th, 1937. (521879.)

34915. "Electrical drives for centrifuges, particularly for use in plant for the production and/or treatment of explosive material." Patentverwertungs Ges. Hermes. November 30th, 1937. (521880.)

34918. "Radio receiving circuits." Marconi's Wireless Telegraph Co., Ltd. November 30th, 1937. (521882.)

35023. "Electrical musical instruments." E. C. Axe (L. Hammond). December 1st, 1938. (521885.)

37347. "Means for illuminating escalators and other staircases." S. Bourne and Bourne & Hollingsworth, Ltd. December 22nd, 1938. (521781.)

1939

14062. "Signs comprising a plurality of gas or vapour filled tubes electrically excited to luminescence." F. Gantner and E. Sorter. June 16th, 1938. (521788.)

Heaters for Railway Points

ELECTRIC heating was employed experimentally in the Buxton area during last winter's severe weather to keep railway track points free from snow. *Modern Transport* explains that the heaters, encased in "Monel" metal sheaths to avoid corrosion, were manufactured by George Bray & Co., Ltd., of Leeds, to the design of the London, Midland and Scottish Railway Co. Three sets of points were fitted with slide chairs specially cast with a cavity underneath, into which the heaters were inserted. Five chairs on each rail, ten for each set of points, were so equipped. All heaters for each set of points were in series, the whole equipment being controlled from a switch in the signal cabin. Loading to 200 W, 2 kW per set of points, was sufficient to deal with a 2-ft. fall of snow. Also, after severe frost, switching on the heaters for from ten to fifteen minutes enabled the points to move much less stiffly. Furthermore, the cost and labour of spreading salt, with its corrosive risk, and of clearing it away and applying fresh oil afterwards were avoided.

C

FINANCIAL SECTION

New Companies. Capital Returns. Debenture Charges. Bankruptcies and Liquidations. Reports and Dividends. Stocks and Shares.

New Companies Registered

Cable Lamp Co., Ltd.—Private company. Registered in Edinburgh June 19th. Capital, £1,000. Objects: To carry on the business of manufacturers of and dealers in electric lamps and all electrical apparatus, &c. H. Morris Robb, 595, Paisley Road West, Glasgow, is the first director. Registered office: 595, Paisley Road West, Glasgow.

E. B. Dennis & Son, Ltd.—Private company. Registered March 31st. Capital, £500. Objects: To carry on business as mechanical, electrical and general engineers, press and machine tool makers, &c. The directors are: E. B. Dennis and Mrs. E. F. Dennis, both of 230, Upminster Road, Rainham, Essex. Registered office: 24, Coleman Street, E.C.2.

Companies' Returns

Statements of Capital

Yorkshire Switchgear and Engineering Co., Ltd.—Capital, £10,000 in £1 shares. Return dated April 16th, 1940. 9,418 shares taken up. £2,382 paid. £7,036 considered as paid. Mortgages and charges, £4,000.

Sigma Electrical Manufacturing Co., Ltd.—Capital, £2,500 in £1 shares. Return dated October 2nd, 1939 (filed May 7th, 1940). 2,300 shares taken up. £1,800 paid. £500 considered as paid. Mortgages and charges nil.

Weldrics (1922), Ltd.—Capital, £25,000 in £1 shares. Return dated December 31st 1939 (filed May 18th, 1940). 15,850 shares taken up. £13,925 paid on 13,850 shares (including £75 paid on 150 forfeited shares). £2,000 considered as paid on 2,000 shares. Mortgages and charges nil.

Sykes and Dyson, Ltd.—Capital, £5,000 in 1,000 preference and 4,000 ordinary shares of £1. Return dated January 11th, 1940. 400 preference and 3,260 ordinary shares taken up. £3,660 paid. Mortgages and charges at date of return, nil. Since registered mortgage dated March 13th, 1940, to secure company's banking account.

British Insulated Cables (S.A.), Ltd.—Capital, £2,000 in £1 shares. Return dated March 5th. All shares taken up. £2,000 paid. Mortgages and charges, nil.

Gent & Co., Ltd.—Capital, £70,000 in 10,000 preference and 60,000 ordinary shares of £1. Return dated March 18th. 7,247 preference and 48,752 ordinary shares taken up. £13,387 paid on 3,957 preference and 9,430 ordinary shares. £42,792 considered as paid on 3,470 preference and 39,322 ordinary shares. Mortgages and charges, £9,000.

Increase of Capital

Edmundsons Electricity Corporation, Ltd.—The nominal capital has been increased by the addition of £1,500,000 beyond the registered capital of £10,000,000. The additional capital is divided into 1,500,000 undefined shares of £1 each.

Mortgages and Charges

Synchronome Co., Ltd.—Particulars filed of debentures not exceeding £8,000, authorised May 7th, charged on the company's property, present and future, including uncalled capital, the amount of the present issue being £4,500. The above debentures rank *pari passu* with debentures created August 8th, 1939.

H. H. Linton & Co., Ltd.—First debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated June 12th, to secure £3,000. Holder: B. W. Brown, "Windyridge," Hankham, near Pevensey.

Bartrum Roylance and Co., Ltd.—Satisfaction to the extent of £1,181 5s. 4d., on August 2nd, 1939, of series of debentures authorised by resolution dated September 10th, 1928, and registered September 27th, 1928. (According to the register of mortgages, the series of debentures registered September 27th, 1928, originally secured £1,181 5s. 4d.) (Notice filed June 6th, 1940.)

Hall Telephone Accessories (1928), Ltd.—Mortgage and general charge on freehold factory and land at 70, Dudden Hill Lane, N.W.10, and the company's undertaking and other property, present and future, including uncalled capital, dated May 23rd, 1940, to secure all moneys due or to become due from the company to the National Provincial Bank, Ltd.

Receiver Appointed

Exceller Manufacturing Co., Ltd.—G. M. Duncan, Aldwych House, Aldwych, W.C.2, was appointed receiver on June 14th, under powers contained in debenture dated May 1st, 1940.

Private Arrangement

Mrs. Ada Mary Illingworth, trading as Illingworth & Son, electricians, 59, St. Mary's Road, Market Harborough.—A meeting of creditors was held on June 12th when the statement of affairs showed ranking liabilities of £526, and, in addition, the bankers were scheduled for £57 in respect of which they held a guarantee. After allowing £12 for preferential claims the net assets were £345, leaving a deficiency of £181. It was reported that Mr. A. E. Illingworth, the original owner of the business, died in April, 1934, and the business had since been carried on by the debtor. The present position was attributed to the decline in sales during the last year. It was decided that the matter should be dealt with under a deed of assignment.

Winding-up Order

W. Seymour & Co., Ltd.—Winding-up order made June 10th by the High Court of Justice.

Company Liquidations

Sign Construction Co., Ltd., 77, Grosvenor Road, S.W.1.—The statement of affairs shows gross liabilities amounting to £7,320, of which £2,686 is expected to rank for dividend, against assets of £323. As a result of meetings of creditors and shareholders held recently the court approved the appointment of Mr. R. H. MacIntyre, 118, Chancery Lane, W.C.2, as liquidator, with a committee of inspection.

T. W. Ashworth, Ltd., wholesale and retail wireless distributors, 41, Castle Street, Liverpool.—The statement of affairs shows liabilities of £1,234, while the assets, valued at £164, are absorbed by the claims of debenture holders. The Official Receiver states that Mr. Ashworth attributes the failure to loss of trade through the international crisis in September, 1938, the renewed tension in the spring of 1939, and later the outbreak of war. He is not in a position to dissent from that opinion, but it would appear that the directors' omission to arrange for the company to be provided with adequate working capital of its own was a contributory cause. The Senior Official Receiver remains liquidator of the company.

John Newbery, Ltd., electrical engineers, 27, Broadway Parade, Crouch End, London, N.8.—The statutory meeting of creditors was held recently, when a statement of affairs was submitted showing ranking liabilities of £1,093, and assets estimated to realise £217, leaving a deficiency, as regarded the creditors, of £876. The issued capital was £200, and so far as the creditors were concerned there was a deficiency of £1,076. A resolution was passed confirming the voluntary liquidation of the company, with Mr. L. G. Jones, Fulwood Place, London, W.C., as liquidator, with a committee of inspection.

Clifford Vowles, Ltd., George Square, Halifax, electrical engineers, &c.—The statutory meeting of creditors was held recently at Halifax, when Mr. C. Vowles, a director of the company, presided. It was reported that the shareholders had previously met, and had passed resolutions for the voluntary liquidation of the company, and had nominated Mr. E. C. Astin, of Halifax, as liquidator. According to a statement of affairs as at June 20th last the unsecured liabilities amounted to £1,118, and the net assets were £1,266, leaving an estimated surplus, subject to the cost of liquidation, of £148. The share capital of the company was £2,500, and there was a deficiency as regarded contributories of £2,352. The creditors passed a resolution confirming the voluntary liquidation of the company, with Mr. C. H. Baker and Mr. E. C. Astin as joint liquidators, with a committee of inspection.

John Leech (Electrical Contractors), Ltd.—Winding up voluntarily. Liquidator, Mr. R. L. Davis, 58, Theobald's Road, London, W.C.1.

Thompson & Dean, Ltd.—Meeting July 30th at King Edward House, New Street, Birmingham, to receive an account of the winding-up by the liquidator, Mr. F. E. Bendall.

Glazart, Ltd.—Particulars of claims to the liquidator, Mr. Frank E. Worley, 15, Commercial Road, Portsmouth, by June 30th.

Bankruptcy Proceedings

W. H. Grange (The Talbot Electrical Company), electrical engineer, 14, Plumstead Road, Thorpe Saint Andrew, Norfolk.—The adjourned public examination was held at the Shirehall, Norwich, recently. Debtor had returned a statement of affairs showing gross liabilities of £3,203, of which £652 was expected to rank for dividend, leaving a deficiency of £143. The examination was closed.

J. K. Thornborough and **E. C. Thornborough** (J. K. Thornborough & Co.), electricians, Crescent Road, Windermere.—First meeting June 28th at 16, Cornwallis Street, Barrow-in-Furness. Public examination July 17th at the Court House, Kendal.

E. A. V. Burton, electrical engineer, 14, St. Peter's Park Road, Broadstairs, Kent.—Supplemental dividend of 10d. in the £, payable July 2nd at 1, The Parade, Canterbury.

A. E. Carter, electrical engineer, 10, Pages Lane, Muswell Hill, London, N.10.—Receiving order made June 14th on a creditor's petition. First meeting held yesterday. Public examination July 17th at Bankruptcy Buildings, Carey Street, W.C.2.

Richfield Electrical Components, electrical contractors.—Receiving order made June 13th on a creditor's petition. First meeting held yesterday. Public examination July 30th at Bankruptcy Buildings, Carey Street, W.C.2.

Reports and Dividends

W. T. Henley's Telegraph Works Co., Ltd.—At the annual meeting held on June 21st Sir Montague Hughman (chairman) said that their rubber cable works had been engaged to the fullest capacity during the whole of 1939 and the number of people employed was considerably higher than the previous year. The paper cable works were extremely busy, but the war had restricted this class of business.

Until the outbreak of war the engineering department maintained the excellent results of the previous year with orders for its normal products. After that, as a result of the reduction in civil building and similar activities the demand for these products fell slightly. This department, however, had other work available to do so that the extensions referred to at the last annual meeting were now well on the way to completion and were not only justified but were likely to prove a timely addition to their manufacturing resources. The contract department had had another successful year. The turnover had shown a substantial increase and the overhead charges a reduction. Their business outside British possessions had been difficult, but they had done a certain amount and results had been satisfactory. Over 28 per cent. of their business was overseas, and this result on an increased turnover was very satisfactory.

(*Continued on page* 689.)

STOCKS AND SHARES

TUESDAY EVENING.

THE issue of the latest War Loan happened to coincide with the melancholy news regarding acceptance of the German and Italian armistice terms by our late Ally. This made a poor send-off to the new loan, the advent of which had been anticipated as likely to bring about an improvement, rather than a reaction, in the prices of the existing senior-class securities. As it turned out, the gilt-edged market was heavy, its prices irresponsive to the desirability of presenting a firm front in view of the need that there is for making the new issue an abounding success.

The dullness in the gilt-edged market is, however, of minor moment by comparison with the flatness which has occurred during the past few business days in the ordinary shares of most industrial companies. With the approach of the end of the half-year, pressure has been, and is still being, applied to people who have borrowed money on the security of stocks and shares. The selling which this initiated has proved to be too much for the receptive powers of possible purchasers, and the price lists overleaf bear sombre witness to the effect of the anxiety to sell which is noticeable in most sections.

Treasury Acquisitions

The British Government has now placed an almost complete ban upon any dealings in stocks, bonds and shares domiciled outside this country. Upon the outbreak of war, the Treasury required the registration at the Bank of England of American, Mexican and various other countries that paid dividend, interest or capital in foreign currencies. This year the Government have requisitioned the British holdings in 177 of these undertakings and the former proprietors have been paid at a fixed price. Curiosity is felt as to whether our Government has sold these stocks or is still a bull of them. The intention was to enable the British Treasury to obtain foreign currency—American dollars, &c.—with which to pay for munitions purchased abroad. The previous proprietors of the stocks that were compulsorily acquired must view with interest the fairly heavy falls that have since occurred.

The Ban on Foreigners

Out of the shares quoted overleaf, Montreal Light, Shawinigan Power, Tokyo Electric, American "Tel. and Tel.," International "Tel. and Tel.," Brazilian Tractions and Rio 5 per cent. bonds can no longer be negotiated in the Stock Exchange market. The prices given in our lists for these stocks are those of June 17, after which all dealings ceased by official order. The spreading of the prohibition over so wide an area was the outcome of the "Cease Fire" order of M. Petain. It is surmised that the German invaders of France have probably helped themselves to whatever securities they found. To prevent any possibility of stolen stocks and shares being marketed in London for the benefit of the enemy, the Stock Exchange Committee has taken a step as rare and arbitrary as it is manifestly essential in the national interest.

Brazil and Argentina

All dealings on this side having been prohibited in the shares of the Brazilian Traction Light and Power Company, interest in the report and figures for last year is mainly abstract. The company earned $1.30 per share as compared with $1.37½ for 1938, in which latter year it paid 50 cents dividend. Nothing is to be paid in respect of the year just ended, owing to the Brazilian exchange situation. The price of the shares is nominally 5½.

Next week there will be held a meeting of the 4 per cent. income debenture stockholders of the Anglo-Argentine Tramways, in order to discuss a somewhat complicated scheme of arrangement. This scheme will operate between the company and its debenture stockholders, and the City of Buenos Ayres Tramways Company. It has had no effect upon the prices of the company's issues quoted in London.

Miscellaneous Matters

The Chloride Electrical Storage Company reports a very good year to the end of March last. The available balance of £408,000 is £73,000 higher than that of the previous twelve-month. Income tax takes an additional £86,000 and after the usual allocations the forward balance of £80,669 is about £1,000 less than that of the corresponding period. The dividend of 15 per cent. for the year is repeated. The price has fallen back to 65s.

The Palestine Electric Corporation, although announcing a net profit for 1939 of £151,000, is to pay no dividend on the ordinary and "A" ordinary shares for the year ended December last. In the previous year 5 per cent. tax free was paid on both classes. The ordinary have given way to 17s. 6d., as much in sympathy with other shares in this department as a consequence of the dividend announcement. Jerusalem Electrics weakened to a guinea in sympathy. East African Power shares are easier at 23s., and in the Indian list Calcutta Electric, at 25s., have fallen a florin.

Six Months' Prices

It is not the usual practice to set out in these columns, at this particular time of year, a comparison of share prices, but war conditions make, we venture to think, such a departure at least excusable. Many people, however little they may feel inclined to invest money in shares of industrial companies whose properties, according to popular apprehension—or misapprehension—are liable to be bombed, still have considerable interest in the extent of the fall that has occurred in shares of leading companies. Therefore no apology would appear to be necessary to excuse the setting out this week of comparative tables showing the prices at the end of last year and those at the end of this June. Some of the changes are out of proportion, it will be argued, to the risks to which the companies are exposed by reason of air-raid possibilities. With this table at hand, investors will be the better able to see what has actually happened during the six months, and to gauge, possibly, the extent to which the fall in values has been overdone.

London Electric List

At the beginning of this year, the ordinary shares in the London electricity supply companies were flat on fears that dividends would be cut because of diminished profits resulting from the black-out, the evacuation of customers and the increased costs of working. The further extent to which the fall in prices has been carried is substantial, as this short table shows:—

Ordinary Share	Dec. 27, 1939	Now	Fall
City of London	26/6	20/–	6/6
County of London	36/3	23/9	12/6
London Assoc. Elec.	20/–	13/9	6/3
Metropolitan	37/–	23/9	13/3
Northmet Power	37/–	24/6	12/6
South London	22/–	20/–	2/–

Out of these six companies, two only, the London Associated and the Metropolitan, lowered their previous dividends. But as the enemy's advance swept nearer to this country, so did apprehensions magnify of possible air-raid damage. Considerations of dividend payment assumed a second place, giving way to fears aroused by the air-raid menace. The low share-prices of to-day are due to this, more than to any other reason.

Provincial Supply Shares

The following list of prices is of interest for the manner in which it emphasises the smaller falls in provincial shares as compared with the heavy drop in the London group. Anxiety in respect of the latter has been more acute, although the possibility of invasion, coupled with recent raids upon different parts of the country, is reflected in the falls shown in the final column:—

Ordinary Share	Dec. 27, 1939	Now	Fall
Bournemouth and Poole	58/9	47/6	11/3
Clyde Valley	33/3	27/6	5/9
Elec. Dis. Yorkshire	35/9	32/6	3/3
Lancs Light and Power	28/9	25/–	3/9
Midland Counties	35/–	25/–	10/–
Midland Elec. Power	36/3	35/–	1/3
North Eastern	27/6	18/9	8/9
Northampton	42/6	41/3	1/3
Scottish Power	32/6	25/–	7/6
Yorkshire Elec.	33/9	25/–	8/9

Owing to the ban laid by the Treasury as a wartime measure upon new issues of capital, there is now no chance of a bonus.

Communication Stocks

Irony seems to lurk in the fall sustaned by Cable and Wireless stocks this year, because they were among the very few which rose superior to the generally unfavourable conditions that ruled through 1939. The report, issued a few weeks ago, was not at all bad; the chairman's speech at the meeting, if cautious, was by no means pessimistic. Yet the preference and the ordinary stocks are heavily down:—

Stock or Share	Dec. 27, 1939	Now	Fall
American Tel. and Tel.	205	190	15
Cable and Wireless pref.	92½	70	22½
Cable and Wireless ord.	56½	35	21½
Great Northern	20½	12½	8
International Tel. and Tel.	5	3	2
Marconi Marine	27/6	18/9	8/9

Anglo-American 6 per cent. preferred at 95½ is distinguished by having a modest rise to its credit. Great Northern Telegraph is a Danish company: no more need be said to explain the drop in the price of the shares. Marconi Marines eased off after a reduction of 2½ per cent. in the dividend. Globe Telegraph and Trust ordinary are practically unchanged since six months ago, in spite of the dividend having been lowered.

Industrial Slump

Within the space of only the last few weeks, industrial shares in every section of the miscellaneous market have given way severely. Air-raid apprehension is again the dominant factor. People are afraid that their companies' property may be hit, and that, although post-war compensation will be payable by the Government, a long period of waiting for it may ensue.

Ordinary Shares	Dec., 1939	Now	Fall
Assoc. Electrical Ind.	38/9	27/6	11/3
Babcock and Wilcox	41/3	30/–	11/3
British Aluminium	50/–	35/–	15/–
British Insulated	80/–	70/–	10/–
Callender's	60/–	50/–	10/–
Crompton Parkinson (5/–)	17/6	12/6	5/–
English Electric	31/3	17/6	13/9
G.E.C.	75/–	56/3	18/9
Ever Ready (5/–)	26/–	18/6	7/6
Johnson and Phillips	41/3	36/3	5/–
J. Lucas	56/3	45/–	11/3
Siemens	20/–	16/3	3/9

ELECTRICAL COMPANIES' SHARES

Prices, Dividends and Yields

Company	1940 High-est	1940 Low-est	Dividend Pre-vious	Dividend Last	Middle Price June 25	Rise or Fall	Yield p.c. £ s. d.
Home Electricity Companies							
Bournemouth and Poole	63/6	47/6	15	15	47/6	−½	6 6 4
British Power and Light	30/–	21/–	7	7	21/–	...	6 13 4
City of London	28/–	20/–	7½	7½	20/–	−1/–	7 10 0
Clyde Valley	38/6	25/–	8	8	27/6	−⅝	5 16 5
County of London	43/3	22/–	10½	10½	23/9	−½	8 16 10
Edmundson's:							
7% Pref.	31/6	28/–	7	7	30/–	...	4 13 4
Ord.	27/6	20/–	9	6	20/–	−1/–	6 0 0
Elec. Dis. Yorkshire	40/3	32/6	9	9	32/6	−2/–	5 10 9
Elec. Fin. and Securities	41/3	38/6	12½	12½	38/9	...	6 9 0
Elec. Supply Corporation	46/3	41/–	12	11½	40/–	−⅛	5 15 0
Isle of Thanet	16/–	5/6	4	4	6/–	−3/–	13 6 8
Lancs Light and Power	33/–	25/–	7½	7½	25/–	−⅛	6 0 0
Llanelly Elec.	21/–	19/6	5½	5½	20/–	...	5 10 0
Lond. Assoc. Electric	21/–	13/6	7	5½	13/9	−9d.	8 0 0
London Electric	37/6	21/–	8	7½	20/–	−⅛	7 5 0
London Power Deb. Red.	105½	102	5	5	102	−2	4 17 6
Metropolitan	41/6	23/6	12	10	23/9	−½	8 0 5
Midland Counties	39/–	25/–	8	8	25/–	−½	6 8 0
Mid. Elec. Power	40/–	35/–	8	9	35/–	...	5 2 10
Newcastle Elec.	29/9	24/6	7	7	24/6	−1/9	5 14 3
North Eastern Electric:							
Ordinary	31/6	18/6	7	7	18/9	−3/3	7 9 4
7% Pref.	32/6	28/6	7	7	28/9	...	4 17 3
Northampton	48/–	41/–	10	10	41/3	−⅛	4 17 0
Notting Hill 6% Pref. (£10)	10½	10	6	6	10½	...	—
Northmet Power:							
Ordinary	42/3	23/–	10	10	24/6	−3/–	8 3 4
6% Pref.	29/–	23/–	6	6	24/–	−1/6	5 0 0
Richmond Elec.	24/6	20/–	7	6	20/–	−2/–	6 0 0
Scottish Power	38/–	24/–	8	8	25/–	−½	6 8 0
Southern Areas	21/3	15/–	5	5	15/–	...	6 13 4
South London	23/3	20/–	7	7	20/–	−⅛	7 0 0
West Devon	20/–	18/6	5	5	20/–	...	5 0 0
West Glos.	21/3	15/6	2½	4½	16/3	−⅛	5 13 10
Yorkshire Elec.	40/–	25/6	8	8	25/–	−½	6 8 0
Overseas Electricity Companies							
Atlas Elec.	4/–	1/6	Nil	Nil	1/9	...	—
Calcutta Elec.	37/–	27/–	10*	8*	25/–	−2/–	6 8 0
Cawnpore Elec.	30/–	25/–	10	10	26/3	+⅛	7 12 4
East African Power	25/6	23/3	7	7	23/–	−6d.	6 1 9
Jerusalem Elec.	24/–	21/6	7	7	21/–	−1/–	6 13 4
Kalgoorlie (10/–)	12/6	9/6	7½	7½	11/6	...	6 10 5
Madras	26/9	25/–	8*	6*	25/–	...	4 16 0
Montreal Power	35½	30	1½	1½	32	+1	—
Palestine Elec. "A"	25/–	17/–	5*	Nil	17/6	−⅛	—
Perak Hydro-electric	20/3	13/6	6	2½	13/9	−9d.	3 12 9
Shawinigan Power	27½	19	83cts.	90cts.	20½	...	—
Tokyo Elec. 6%	69	52	6	6	52½	...	11 8 6
Victoria Falls Power	75/9	57/–	12½	15	57/6	−½	5 4 4
Whitehall Investments Pref.	17/9	10/–	7½	7½	10/–	−3/–	15 0 0
Public Boards							
Central Electricity:							
1950–70	110½	104	5	5	104½	...	4 15 8
1955–75	112½	106	5	5	106½	...	4 14 0
1951–73	107½	102	4½	4½	102½	...	4 7 10
1963–93	96½	90	3½	3½	91½	...	3 16 6
London Elec. Trans Gtd.	92	87½	2½	2½	89	...	2 16 2
London & Home Counties							
1955–75	113½	105	4½	4½	105½	...	4 5 4
Lond. Passenger Transport							
A	116	104	4½	4½	105	...	4 5 9
B	116	103	5	5	104½	...	4 15 8
C	65½	27	1½	...	25	−7½	—
West Midland Joint Elec.							
1948–68	106½	105	5	5	105½	−1	4 14 9
Telegraph and Telephone							
American Tel. & Tel.	215	180	9	9	190	...	4 14 9
Anglo-Am. Tel.:							
Pref.	106	93½	6	6	95½	...	6 5 8
Def.	23½	21	1½	1½	21½	...	6 19 6
Anglo-Portuguese	22/6	16/6	8	8	16/3	−½	9 17 0
Cable & Wireless:							
5½% Pref.	99½	70	4½	5½	70	−7½	7 17 2
Ord.	65	28½	4	4	35	−2½	11 8 8
Income	99½	93	...	...	95	−3½	4 3 9
Canadian Marconi $1	6/–	4/–	Nil	4cts.	4/3	...	—
Globe Tel. & Tel.:							
Ord.	32/6	27/–	7½*	6*	27/6	...	4 7 3
Pref.	28/9	23/6	6	6	23/9	—	5 1 1
Great Northern Tel. (£10)	20	11	20	20	12½	...	—
Inter. Tel. & Tel.	5½	3	Nil	Nil	3	...	—
Marconi-Marine	30/–	18/6	10	7½	18/9	—	8 0 0
Oriental Telephone Ord.	2⅞	49/6	12*	11½*	2½	...	4 12 0
Telephone Props.	15/–	12/6	5	6	12/6	...	9 12 0
Telephone Rentals (5/–)	9/6	6/0	10	10	6/3	−3d.	8 0 0
Traction and Transport							
Anglo-Arg. Trams:							
First Pref. (£5)	4/3	3/–	Nil	Nil	3/–	...	—
4% Inc.	11½	4	Nil	Nil	5½	...	—
British Electric Traction:							
Def. Ord.	830	450	5	5	475xd.	...	—
Pref. Ord.	169	147	8	8	152xd.	...	5 5 3
Bristol Trams	48/6	40/–	10	8*	41/3	...	3 17 8
Brazil Traction	12½	5½	$1	50c.	5½	...	—
Calcutta Trams	24/–	20/–	8	8	20/–	...	8 0 0
Cape Elec. Trams	18/6	16/–	5	5	18/–	...	5 11 1
Lancs Transport	35/–	28/3	10	10	32/6	...	6 3 1
Mexican Light:							
1st Bonds	33	27	5	5	27½	−3	—
Rio 5% Bonds	90	74	5	5	80	...	6 5 0
Southern Rly.:							
5% Prefd.	79	35	5	5	38	−2	13 3 2
5% Pref.	104½	63	5	5	63½	−7	7 17 6
T. Tilling	45/9	31/–	10	10	31/3	...	6 8 0
Tilling & B.A.	47/6	43/9	9*	8*	47/6	...	3 7 10
West Riding	35/–	28/6	10	10	30/–	−2	6 13 4
Equipment and Manufacturing							
Aron Electricity Ord.	17/6	15/–	15	15	17/6	...	—
Assoc. Elec.:							
Ord.	43/3	27/–	10	10	27/6	−⅜	7 5 6
Pref.	35/3	32/3	8	8	33/9	−⅛	4 14 10
Automatic Telephone & El.	47/3	36/6	12½	12½	37/6	...	6 13 4
Babcock & Wilcox	50/–	78/6	10	11	30/–	−⅜	6 13 4
British Aluminium Ord.	56/–	34/–	12½	12½	35/–	−¾	7 2 10
British Insulated Ord.	92/6	70/–	20	20	70/–	−½	5 14 3
British Thermostat (5/–)	14/9	10/9	18½	18½	10/0	−½	7 9 3
British Vacuum Cleaner(5/-)	12/6	8/6	40	12½	10/–	...	6 5 0
Brush Ord.	4/6	2/–	Nil	Nil	2/6	...	—
Callender's	69/–	50–	15	15	50,–	−½	6 0 0
Chloride Elec. Storage	72/6	65/–	15	15	3½	−½	4 12 4
Consolidated Signal	72/6	59/–	36½	17	71/3	...	4 15 4
Crabtree (10/–)	24/9	20/6	17½	17½	20/–	−⅛	8 4 9
Crompton Parkinson: Ord. (5/–)	20/–	12/6	15	20	12/6	−1/–	8 15 0
E. K. Cole (5/–)	5/–	3/3	10	Nil	3/6	−6d.	—
Elec. & Musical Industries (10/–)	10/3	4/3	5	Nil	4/6	...	—
Electric Construction	36/3	30/–	12½	13½	30/–	...	9 0 6
Enfield Cable Ord.	56/–	46/3	25	16½	46/3	−½	7 1 0
Electrical Switchgear (10/–)	22/6	20/–	16	10	20/–	...	5 0 0
English Electric	33/9	17/–	10	10	17/6	−¼	11 8 6
Ensign Lamps (5/–)	15/3	13/9	25	25	13/9	...	9 1 10
Ericsson Tel. (5/–)	39/3	27/–	25*	25*	27/6	−½	4 11 0
Ever Ready (5/–)	28/3	18/3	30	40	18/6	−6d.	10 16 2
Falk Stadelmann	18/3	17/6	10	6	17/6	...	6 17 4
Ferranti Pref.	25/–	23/–	7	7	25/–	...	5 12 0
G.E.C.: Pref.	32/6	28/–	6½	6½	27/6	−2/–	4 14 6
Ord.	83/3	56/–	17½	20	56/3	−¼	7 2 4
Greenwood & Batley	25/6	21/3	15	15	21/3	...	14 2 4
Hall Telephone (10/–)	18/6	15/–	15	10	15/–	...	6 13 4
Henley's (5/–)	21/6	13/6	20	20	13/9	−¼	7 5 6
4½% Pref.	21/3	20/6	4½	4½	21/3	...	4 4 8
Hopkinsons	46/9	37/6	12½	15	37/6	...	8 0 0
India-Rubber Pref.	21/–	20/–	5½	5½	20,9	...	5 6 0
Intl. Combustion	121/3	75/–	32½	32½	3⅜	−⅜	8 10 8
J. Lucas	60/6	42/3	15	15	45/–	−⅜	6 13 4
Johnson & Phillips	50/9	35/–	12½	15	36/3	...	8 5 6
Lancashire Dynamo	59/9	52/6	25	20	52/6	...	7 12 6
Laurence Scott (5/–)	11/–	9/3	15	15	9/–	...	8 6 8
London Elec. Wire	25/6	25/–	12	7½	25/–	...	6 0 0
Mather & Platt	46/6	35/–	13½	10	35/–	...	5 14 3
Metropolitan Elec. Cable Pf.	22/–	21/3	5½	5½	21/3	...	5 3 6
Murex	86/9	52/6	20	20	52/6	−10/–	7 12 0
Pye Deferred (5/–)	9/–	7/–	25	25	8/6	...	14 14 2
Revo (10/–)	20/9	16/3	17½	17½	16/3	...	10 15 4
Reyrolle	60/6	45/–	12½	12½	45/–	...	5 11 1
Siemens Ord.	23/9	16/3	7½	7½	16/3	−⅛	9 4 8
Strand Elec. (5/–)	2/3	1/–	10	4	1/3	...	10 0 0
S. Smith (1/–)	8/–	3/6	37½	50	3/9	...	13 6 8
Switchgear & Cowans (5/–)	11/9	7/6	20	10	10/–	...	5 0 0
Telegraph Condenser (10/–)	8/9	6/3	5	—	8/9	...	—
Telegraph Construction	42/6	32/6	10	10	32/6	...	6 3 1
Telephone Mfg. (5/–)	9/–	6/–	9	9	6/–	−6d.	7 10 0
Tube Investments	96/9	64/–	23¾	23¾	62/6	−16/6	7 13 10
Vactric (5/–)	3/6	2/–	4	Nil	2/6	−3d.	—
Vickers (10/–)	22/–	10/–	10	10	10/–	−⅛	10 0 0
Ward & Goldstone (5/–)	19/9	19/3	20	20	19/9	...	5 1 3
Westinghouse Brake	46/–	32/9	17½	10	35/–	−½	5 14 3
Walsall Conduits (4/–)	26/6	21/–	55	65	23/9	...	9 5 2
West, Allen (5/–)	7/–	4/6	10	7½	5/–	...	7 10 0

* Dividends are paid free of Income Tax.

CONTRACT INFORMATION

Particulars of work for which tenders are invited, contracts placed, and building schemes promising work for electrical contractors and traders

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses. Further details of items marked with an asterisk can be obtained from the Department of Overseas Trade (Inquiry Room), Great George Street, London, S.W.1.

Birmingham.—July 3rd. Electric Supply Department. AC and DC distribution boards. (June 14th.)

Eire.—CARLOW.—July 10th. District Mental Hospital Board. Refrigerating equipment. N. Matthews, 104, Grafton Street, Dublin (deposit £5 5s.). ENNIS (Co. CLARE).—July 5th. U.D.C. Electrically driven sewage pumping plant consisting of No. 2 vertical pattern sewage pumps, capacity 625 gal. per min. each, and No. 2 vertical pattern storm water pumps, capacity 2,700 gal. per min. each, complete with motors, suction and discharge piping fittings, valves, &c. Town Clerk, Town Hall (£10 10s. deposit).

London. — COMMISSIONERS OF HIS MAJESTY'S WORKS.—June 28th. Boiler feed water treatment plant in the North-Eastern area. Room 425, 4th Floor, H.M. Office of Works, Abell House, John Islip Street, S.W.1 (deposit £1).

New Zealand.—CHRISTCHURCH. — July 18th. Electricity Department. Sixteen 200-kVA, 10,500/415-V, 50-cycle, three-phase oil-immersed outdoor-type transformers. (T. 20327/40.)*

WELLINGTON.—July 24th. Post and Telegraph Department. Four heating and ventilating units, each comprising a centrifugal fan with motor, an air filter and an electric heater. (T. 20448/40.)*

Sleaford.—July 20th. Electricity Department. L.V. underground mains and overhead lines. (See this issue.)

South Africa.—JOHANNESBURG. — City Council. July 13th. Cut-outs for pole mounting. (T. 20410/40.)* 800 6,600-V, 300-A isolating links of the single or double bladed types. (T. 20409/40.)* 900 low-voltage lightning arrestors. (T. 20408/40.)*

Electrical domestic equipment, comprising washing machines, water heaters, cookers and refrigerators. (T. 20543/40.)

July 13th. Stores Department. Insulated type house service cutouts. (T.Y. 20539/40.)*

CAPE TOWN.—August 21st. Electricity Department. Extra-high-voltage line material. (T. 20418/40.)* Transformer. (T. 20417/40.)*

UMTALI (SOUTHERN RHODESIA).—July 26th. Municipality. Electrical material for use in the reconstruction of the electricity undertaking, including 3,300-6,600-V link cubicle, 3,300-V oil circuit-breakers, main e.h.v. receiving switchboard, ring main isolators and tee-offs, e.h.v. and l.v. cable, trans- and trifurcating boxes, and l.v. end dividing boxes. (T. 20472/40.)*

Straits Settlements.—SINGAPORE.—September 16th. Municipal Water Department. Pumping plant for the MacRitchie reservoir. (T. 20241/40.)*

Sunderland.—July 1st. Town Council. Choke and condenser mains filters, suppressors, electric kettles, boiling rings, and other electrical apparatus and equipment in connection with the extension of Cherry Knowle Hospital. Medical Superintendent, The Hospital, Ryhope.

Wolverhampton.—July 2nd. West Midlands J.E.A. Transmission line and cables and 11-kV distribution switchgear. (June 14th.)

Orders Placed

Bedford.—Electricity Committee. Accepted. Two 500-kVA transformers for installation at the Foster Road substation (£876).—British Electric Transformer Co. One five-panel switchboard, comprising type KOA/16 units with wing isolators and remote controlled switches, for the generating station auxiliaries (£846), two 11-kV oil isolator units, separately mounted for the outgoing feeders to Kempston and the brickworks (£148), and extra-high-voltage switchgear for installation in the Midland Road-Prebend Street substation (£1,894).—Met.-Vick. Electrical Co. High-voltage switchgear for installation in the Midland Road-Prebend Street substation (£1,080).—Ferguson, Pailin.

Brighton. — Corporation. Recommended. Additional fire protection at Southwick power station.—Mather & Platt.

Coventry.—Electricity Committee. Accepted. Coal-handling plant (£4,294).—Fraser & Chalmers. Transformers (£3,745).—Electric Construction Co.

Gas Committee.—Accepted. Electric

Financial Section (*Concluded from page 686*)

Reports and Dividends—contd.

Mr. W. F. Bishop (general manager), in seconding the resolution for the adoption of the report and accounts, said that up to the outbreak of war their business was progressing satisfactorily and a considerable volume of important work had been, or was being, carried out, particularly in super-tension cables, in which their output was greater than ever before, and they felt the advantage of the additional plant and equipment recently installed. Fortunately, they were able in most cases to complete their contracts. With regard to Henley's Tyre & Rubber Co., up to the outbreak of war the progress made in their tyre sales was satisfactory, and although after war broke out the sales of car tyres decreased, the sales of giant tyres were much greater.

Lisbon Electric Tramways, Ltd.—At the annual meeting held on June 20th, Mr. A. Newcombe Rye (chairman) said that during the past year their traffics had continued to be satisfactory, 134.2 million passengers having been carried on their system, against 131 millions in the previous year. Prior to the war they were committed to a substantial programme of extensions and improvements of their service to keep step with the progress of the town-planning schemes being carried out in Lisbon. They intended to go forward with this scheme so far as supplies of material permitted.

Newton Bros. (Derby), Ltd., are paying a first and final dividend of 12½ per cent. for the year to March 31st. This is at the same rate as for the previous year when a capital bonus of 100 per cent. was also distributed.

The Atlas Electric & General Trust, Ltd., reports that interest, dividends and other income for the year to March 31st amounted to £303,450, against £304,898 for 1938-39. After deducting taxation, debenture interest and other expenses, there is a credit balance of £158,163 (£179,329). The dividend on the 7 per cent. preference shares absorbed £129,281 and the balance carried forward is increased by £28,882 to £125,226.

The Palestine Electric Corporation, Ltd., reports a trading profit for 1939 of £321,298, as compared with £323,280 for 1938, and a net profit of £151,435 (£183,192). The preference dividends require £47,681, tax reserve receives £52,000, and the balance carried forward is £75,323 (against £23,568 brought in). In view of the international situation and the necessity of conserving resources, no dividend is recommended on the ordinary and "A" ordinary shares. Last year 5 per cent. tax free was paid on both classes.

Hick Hargreaves & Co., Ltd.—Presiding at the annual meeting held on June 25th, Mr. W. D'Arcy Madden (chairman and managing director) said that all departments of the works had been fully employed throughout the year, and the turnover was 4 per cent. greater than in the previous year. The company's order book was in a satisfactory condition, the value of the uncompleted work being greater than at any period during the past 20 years. The contracts on which they were engaged included large condensing plant and auxiliaries for the great power stations of the country, high vacuum apparatus for the chemical industry, industrial steam turbines, turbo compressors for the Colonies, rotary air compressors and vacuum pumps for many industries.

The Revo Electric Co., Ltd., reports a net profit for the year ended March 31st of £90,293, from which are deducted income tax, N.D.C., directors' fees, staff pension and life assurance scheme and other charges, leaving a balance of £34,453, to which is added £66,486 brought in. The interim dividend already paid takes £11,944, leaving a balance of £88,996, which is carried forward. The report states that the trading profits, although less than those of last year, are considered satisfactory in view of the conditions prevailing in the industry during the last six months of the financial year, involving a transition stage in the nature of the company's productions. The directors regret, however, that they are unable to recommend the payment of a final dividend.

The Electrical Finance & Securities Co., Ltd., held its annual meeting on June 20th, when Mr. G. H. Nisbett (chairman), who presided, said that the number of consumers at the end of 1939 was 62,903, 5,300 additional consumers being connected during the year, compared with a rise of 6,650 in 1938. The total connected load was 177,374 kW, an increase of 22,838 kW as against the rise of 23,050 kW in the previous year, while the total number of kWh sold rose by 5,400,000 to 64.8 millions. It was regretted that it had been necessary to make an increase in the kWh charge to two-part tariff consumers in all areas.

The Chloride Electrical Storage Co., Ltd., reports a profit for the year to March 31st, including distribution by a subsidiary of profit realised on the sale of fixed assets, and after providing for E.P.T., of £408,501, as compared with £335,691. After providing for income tax, &c., net profits were £273,942 (£291,242) from which £22,000 is allocated to pension and benefit funds. General reserve receives £75,000, and the dividend on the "A" and "B" ordinary stock is 15 per cent. (same). The balance carried forward is £81,581 (against £80,669 brought in).

Christy Brothers & Co., Ltd., have declared an ordinary dividend of 10 per cent. for 1939 (against 11 per cent. in 1938).

Taylor Tunnicliff (Electrical Industries), Ltd., is paying an interim ordinary dividend of 2½ per cent. less tax (same).

The Welwyn Garden City Electricity Supply Co., Ltd., reports that in 1939 sales of electricity rose from 13.5 million kWh to 16.5 million kWh, the profit increasing from £14,440 to £18,586. An ordinary dividend of 9 per cent., tax free, is recommended and £968 is carried forward.

R. B. Pullin & Co., Ltd., announces an interim ordinary dividend of 5 per cent., the same as in 1938.

Mirrlees, Bickerton & Day, Ltd., are again paying an ordinary dividend of 6 per cent. for the year to March 31st.

The Electric and General Investment Co., Ltd., reports a revenue for 1939 of £13,185, a decrease of £1,957 compared with the previous year. The net profit was £2,795 (£4,263). A final ordinary dividend of 5 per cent. is announced, making 7½ per cent., less tax, for the year (same but plus a jubilee cash bonus of 2½ per cent.), and £19,403 is carried forward against £19,458 brought in.

detarring plant (£1,815).—Whessoe Foundry & Engineering Co.

Gravesend. — Electricity Committee. Accepted. Oil testing set (£60).—B.T.H. Co.

London.—Metropolitan Water Board. Accepted.—Two portable hand-controlled electrically operated belt conveyors, hopper, chutes, coal valves, &c., Moxey Conveyor & Transporter Co., Ltd.

Accepted. Electricity installation at Wansunt pumping station (£141).—G. E. Taylor & Co.

HAMMERSMITH.—Executive and Civil Defence Committee. Accepted. Supply and erection of 11-kV metalclad switchboard (£3,326).—G.E.C. tenders ranging from £2,560 to £4,114 were received from eight manufacturers.

ST. PANCRAS.—Electricity Committee. Accepted. Replacement of boiler superheater (£682).—Babcock & Wilcox, Ltd.

Portsmouth.—Health Committee. Accepted. Fire alarm installation at St. Mary's Hospital (£800).—Shields & Marshall.

West Hartlepool.—Town Council. Accepted. Two transformer panels, fitted with Merz-Price protective transformers, for the Mulgrave substation.—A. Reyrolle & Co.

Wimbledon. — Electricity Committee. Accepted. Low-voltage switchgear (£614).—J. G. Statter & Co. High-voltage switchgear equipments (£1,459).—English Electric Co. High-voltage vertical isolation units (£1,210).—Drake & Gorham. Extra - high - voltage switchgear panels (£3,180).—A. Reyrolle & Co. Five 1,000 kVA transformers (£2,445).—Bonar, Long & Co. Four 200-kVA transformers (£468).—Bryce, Ltd. Four 200-kVA transformers (£468).—Foster Engineering Co.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Accrington.—Proposed hospital, Baxenden; secretary, Accrington and District Joint Hospital Board.

Acton.—Works additions, Victoria Road; G. Phillip & Son, Ltd.

Barrow-in-Furness.—Completion of 76 houses, Greengate Street; F. L. Wooldridge, borough surveyor.

Becontree.—Factory additions, Oxlow Lane; A. & H. Simmonds.

Billingham-on-Tees.—Cleansing station for the U.D.C. (£1,500); C. H. Webster, builder, Billingham.

Bolton.—Additions, Lostock Mills; Crosses & Winkworth Mills, Ltd.

Additions, Beehive Foundry, Bark Street; Ryder Bros., Ltd.

Works additions, Clegg Street; Haslam's, Ltd.

Warehouse extensions, Prospect Street; Barlow & Jones, Ltd.

Bradford.—Additions to works, Bradford Road; B. D. Fairbanks & Son, architects, 11, Hallfield Road.

Brighton. — Buildings, Greenways, £4,000; St. Dunstan's trustees.

Caernarvonshire.—Extensions to Galltysil Hospital; W. L. Jones, county architect, Shirehall Street, Caernarvon.

Carlisle.—Shelters near Arthur Street and Nicholson Street for the City Council; P. Parr, city engineer, 18, Fisher Street, Carlisle.

Carmarthenshire.—Cubicle block at County Isolation Hospital, Llwyncwtta, Tumble, for C.C.; W. V. Morgan, county architect, County Offices, Carmarthen.

Cheadle.—Sewage works extensions, for R.D.C.; surveyor, Council Offices, Leek Road, Cheadle, Staffs.

Chelmsford.—Hospital block (£20,000), London Road, for Chelmsford and Essex Hospital governors; W. H. Pertwee and Howard, architects, The Institute, London Road.

Cheshire.—New Technical College at Crewe; F. Anstead Browne, county architect, The Castle, Chester.

Chester.—Office block, &c., at Blacon; G. Burkinshaw, town clerk, Town Hall.

Chesterfield.—Headquarters for A.F.S. at Brampton; borough engineer.

Croydon.—Public shelters (12); E. Taberner, town clerk, Town Hall.

Cupar.—Public air-raid shelters; burgh surveyor.

Darlington.—Canteen for Chemical and Insulating Co., Ltd.; Dunn and Dunnwell, builders, Arden Street, Darlington.

Devon.—Shelters at various towns (£14,500); H. V. de Courcy Hague, county architect, Heavitree Road, Exeter.

Dunfermline.—Houses; Brucefield, for Scottish Special Housing Association, Ltd., 11, Drumsheugh Gardens, Edinburgh, 3.

Eire.—DUBLIN.—Additions and alterations to the Veterinary College of Ireland, Ballsbridge, for Commissioners of Public Works; G. P. Fagan, secretary, Office of Public Works, Dublin.

Proposed bus station; borough engineer.

Farnborough.—Houses (50), for U.D.C.; surveyor, Council Offices, Town Hall, Farnborough, Hants.

Glasgow.—Victoria Biscuit Works, Tollcross; Macfarlane, Lang & Co., Ltd.

Hendon.—Ground floor factory extension, Grenville Place, Mill Hill, for the Rawlplug Co., Ltd.; W. H. Armfield, Ltd., 8, Station Road, S.W.12.

Hucknall.—Proposed fire station, Gilbert Street, for U.D.C.; surveyor, Council Offices.

Kilmarnock.—Extension of general engineering department for Glenfield & Kennedy, Ltd.; manager.

Limehurst.—Shelters (55), at Waterloo, Littlemoss, and Bardsley, for R.D.C.; surveyor, Council Offices, Waterloo, Ashton-under-Lyne.

Llanelly.—Houses (6), Trimsaran, for R.D.C.; E. Morgan, architect, 63, Murray Road, Llanelly.

London. — BATTERSEA. — Extensions, Flour Mills, Church Road; John A. Rosevear.

DEPTFORD.—Shelters; H. G. Reed, Deptford Town Hall, New Cross, S.E.14.

POPLAR.—Saw mill additions, Upper North Street; Lusty & Sons.

A.R.P. shelters (£8,000); Callow & Wright, builders, 207, Brondesbury Park, N.W.2.

Warehouse, Ferry Road; Locke, Lancaster & Johnson, Ltd.

SOUTHWARK.—A.R.P. shelters (£14,000); James Carmichael (Contractors), Ltd., 331, Trinity Road, S.W.18.

ST. PANCRAS.—A.R.P. shelters (£8,000); borough engineer.

Manchester.—Additions to works for spraying room, Sharston Road, Northenden, for E. Wilcox & Co., Ltd., Sharston Road.

Conversion of disused hospital, Cheetham, into factory and warehouse for David Horwich, 35, Old Hall Road, Broughton Park, 7.

Factory, 91a, Rusholme Road, Chorlton-upon-Medlock, for Burnside Manufacturing Co., Ltd., 59, Whitworth Street. Houses (8), Dene Road, Didsbury, &c.; Freeholds and Leaseholds, Ltd., 60, Spring Gardens, Didsbury.

Middlesbrough.—Air-raid shelter at greyhound track for National Greyhounds, Ltd.; Kitching and Co., architects, 21, Albert Road, Middlesbrough.

Montgomeryshire. — Offices, &c., Penygloddfa School, Newtown; H. W. Jones, director of education, County Offices, Newtown.

Morley.—Additions to Prospect Mills for J. & S. Rhodes, Ltd.; architects, Binks & Cannon, Queen Street, Morley.

Northern Ireland (BELFAST).—Domestic and communal shelters; City Engineer's Department, Room 94, City Hall.

Nottingham.—Women's accident ward at the General Hospital, Nottingham (£50,000); William Woodsend, Ltd., contractors, Wharf Road, Castle Bromyard, Nottingham.

Oxford.—Doctor's quarters, Radcliffe Infirmary; Calcutt and Hunt, builders, Marston, Oxford.

Pwllheli.—Adaptation of Bryn-Beryl as children's hospital; Mrs. E. E. Robins-Owen, secretary.

Rawtenstall.—Reconstruction, Whitewell Works, Waterfoot; J. H. Hirst, Ltd.

Timber drying kilns, Isle of Man Mill; Excelsior Heels, Ltd.

Richmond (Yorks).—Air-raid shelters at Catterick; F. Blenkinsopp, Rural District Council Offices, Richmond.

Rochdale.—Rebuilding "Wellington" Hotel, for Higson's Brewery Co., Ltd., 117, Dale Street, Liverpool (£20,000); H. H. Clough, architect, Old Market Chambers, Rochdale.

Rushden. — Additions to slaughterhouse, Bedford Road; Rushden Industrial Co-operative Society, Ltd.

Sheffield.—Workshops, store and alterations, Hermitage Street, and Hermitage Lane, for John May (Sheffield), Ltd., 33, Arundel Street, Sheffield.

Warehouse for C. & J. Hampton, Ltd., Bernard Road, Sheffield.

Works additions, Priestley Street; Sheffield Silver Plate and Cutlery Co., Ltd.

Additions, Albion Works, Savile Street; Thos. W. Ward, Ltd.

Stourport-on-Severn.—Alterations and additions to office block, Wilden Ironworks, for Baldwin's, Ltd.; Lacy Bros., contractors, Adam Street, Kidderminster.

Stretford.—Shelters, Gorse Hill School, and Upper Chorlton Road; borough engineer.

Stroud.—Houses for R.D.C.; surveyor, Council Offices, John Street, Stroud, Glos.

Walton and Weybridge.—Domestic shelters (50) for U.D.C.; E. A. Lister, surveyor, Council Offices, Walton-on-Thames.

Wellingborough. — Public shelters (£4,420), for U.D.C.; surveyor, Council Offices.

Wigan.—Flats, 12-16, Swinley Road; A. Brown, 32, Kenyon Road.

Workington.—Offices, Moss Bay Road, for W. Thomas & Co. (Workington), Ltd.; W. A. Walker, contractors, Elizabeth Street, Workington.

Houses on the Salterbeck estate; A. B. Cooper, Town Hall, Workington.

Yorkshire.—Air-raid shelters throughout the North Riding; R. Sawtell, County Hall, Northallerton.

Claim for Damages Dismissed

A CLAIM for £1,000 damages brought against the Antrim Electricity Supply Co., Donegall Square, Belfast, was heard in the Ulster King's Bench recently.

The action was brought by James Joseph M'Laughlin, aged twelve, who sued through his father. The boy sustained a severe electric shock when he climbed a pylon at Fair Hill, Maghera, and alleged negligence in the erection and control of the pylon. Defendants denied negligence or hidden danger, and contended that the boy ought to have been aware of the danger of interfering with the pylon.

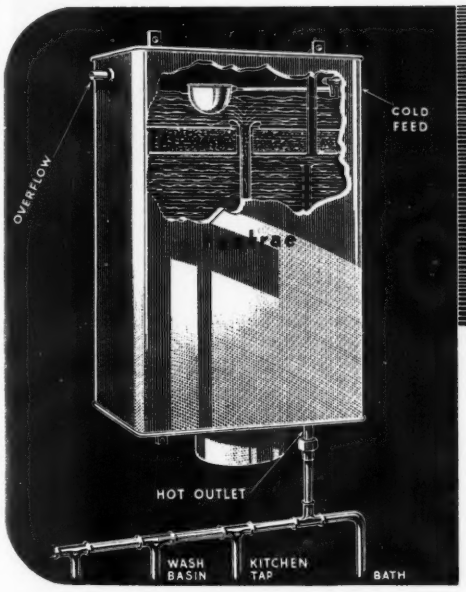
The boy, in evidence, stated that on September 23rd, while playing with three other boys, he proceeded to climb up between two poles, followed by another boy. When he got up and touched the wire he received a violent shock and fell back against the cross-bar. Somebody brought him down. In reply to Mr. Justice Brown he said he had seen three other boys climbing the poles that day and did not know it was dangerous. Medical evidence was given that the boy's hands were burned, one finger had contracted, and his nervous system had been affected.

Mr. R. Boyton, managing engineer of the Antrim Co., said that until he heard the boy describe how he climbed up he would have said it could not be done. The pylon had the standard barbed wire protection, there was a "danger" notice, and the distance from the ground to a live wire was 17½ft. The voltage was 33,000. In reply to a question he said he did not know how the boy escaped.

Mr. Justice Brown, dismissing the action, held that plaintiff was a trespasser. He fixed damages at £232 in the event of a successful appeal.

Chilean Lamp Imports

The Chilean Government has fixed the quota for electric light bulbs for the period February 9th to June 30th at 83,000 kg. gross and for the remaining six months of the year at 100,000 kg. gross. The net quantity permitted to be imported is arrived at by deducting the production of the Chilean factories for consumption in the country.



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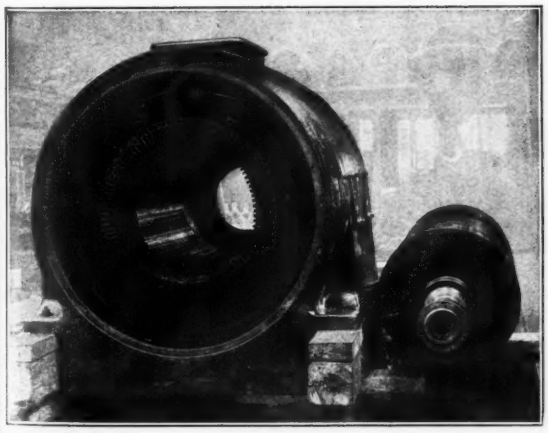

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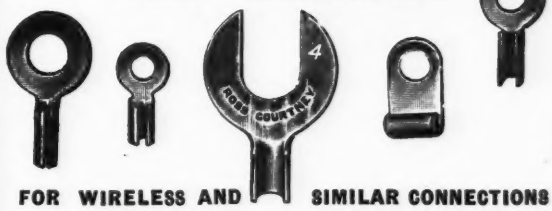

FOR WIRELESS AND SIMILAR CONNECTIONS
A WIDE RANGE OF SIZES IN STOCK.
Repetition Pressed and Turned Work in all Metals.

ROSS COURTNEY & CO. LTD.
ASHBROOK ROAD, LONDON, N.19.

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to the specific requirements of our customers.

Makers of all types of repetition products from the bar in all metals.

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(ENGINEERS) LIMITED

Manufacturers of

Railway Switchgear
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Works:
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London Office:
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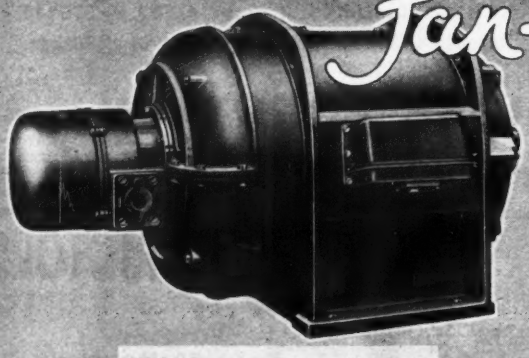
PEEBLES

Thru Draft T.E.
GIVE POSITIVE PROTECTION
Fan-Cooled Motors



150 B.H.P. 3-phase 50 cycle 400 volt 740 r.p.m. Totally Enclosed Fan Cooled A.C. Slip-ring Motor. All-steel construction provides for exceptional mechanical strength and reliability under hard service conditions.

TOTALLY ENCLOSED CONSTRUCTION gives complete protection against entrance of injurious elements.

EFFICIENT COOLING. Heat generated inside the motor is **EFFECTIVELY DISSIPATED** by the **DUAL AIR CIRCUITS.**

NON-CLOGGING AIR PASSAGES. There are no confined air passages to become clogged and thus limit the load capacity of the motor.

EXTERNAL FAN at **NON-DRIVING END** gives user complete freedom in choice of drive as, whatever its form, the air stream cannot be restricted by it.

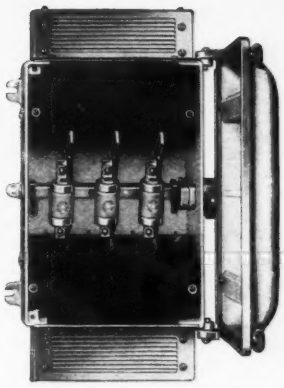
Other advantages are dealt with in Leaflet No. 248—write for a copy.

BRUCE PEEBLES & CO., LTD.
ENGINEERS - EDINBURGH.

3513.

INTRODUCING:

BILL H·R·C FUSE SWITCHES



Possessing the rupturing capacity of its namesake, the Bill "H.R.C." Fuse Switch answers the latest requirements for factory installations with a supreme safety factor and perfect control. Completely new and incorporating advanced electro dynamic and design features, the "H.R.C." is a fully developed unit of control. Made for 30, 60, 100, 200, 300, 400 and 500 amperes; D.P., T.P., 4-pole; and with Neutral Links.

DESIGN. Location of the "English Electric" cartridge over the switch movement permits a consequently shorter unit. For rigidity the case is solid cast iron. Insulation is solid hydraulic compressed Bakelite—china fractures and brush bar "earths," so prevalent with "wrapped" steel bars, are thereby eliminated. The "M" type contact clips ensure a strong pressure contact.

ACTION. Quick make and break with a rotary movement, giving a simultaneous make and break on both poles. Arcing at the contacts is thereby greatly minimised.

FUSES. The "English Electric" high rupturing capacity cartridge fuse needs no introduction as the ideal fuse for circuits having a high K.V.A. short circuit value. They are non-deteriorating and have a rupturing capacity of 25,000 K.V.A. at 600 volts, 50 cycles.
Copper links for use in place of the cartridges can be supplied when the circuit is not required to be fused. A rack for spare cartridges is fitted inside the switch cover.

WIRING. Deep detachable end-boxes allow ample wiring room. Cables have a free "in and out" run. For bus-bar mounting a special end-box is supplied which is bolted directly to the bus-bar chamber. Suitable cable glands are offered for special cable.

See List No. 53 H.R.C.

BILL SWITCHGEAR LTD
ASTON LANE · PERRY BARR
BIRMINGHAM·20

THE DISTINCTIV BILL ELECTRICAL GEAR

LONDON:
A. W. ZELLEY,
73. GREAT PETER ST.,
WESTMINSTER, S.W.1.
SCOTLAND & N. IRELAND:
POTTER, COWAN & CO., LTD.,
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SOUTH COAST:
A. M. EVERETT,
17, LONDON RD.,
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1938—**A REVOLUTION IN WASHER DESIGN.**

1940—**FIRMLY ESTABLISHED AS THE PREMIER HEATED ELECTRIC WASHING MACHINE.**

THE

"DRAGOR SUPEREASY"

1940 MODEL

INCORPORATES

SAFETY RELEASE WRINGER THAT STOPS MECHANISM.

AUTO WATER LEVEL CUTOUT.—HEAT CANNOT BE SWITCHED ON WITHOUT WATER IN PAN.

STAINLESS STEEL PAN.—CANNOT CHIP OR CORRODE.

TABLE TOP.—VITREOUS ENAMEL.

Every Engineer should introduce the "Supereasy" to his consumers. Ready Sales will result.

Full details from—

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Telephone: Temple Bar 3993.

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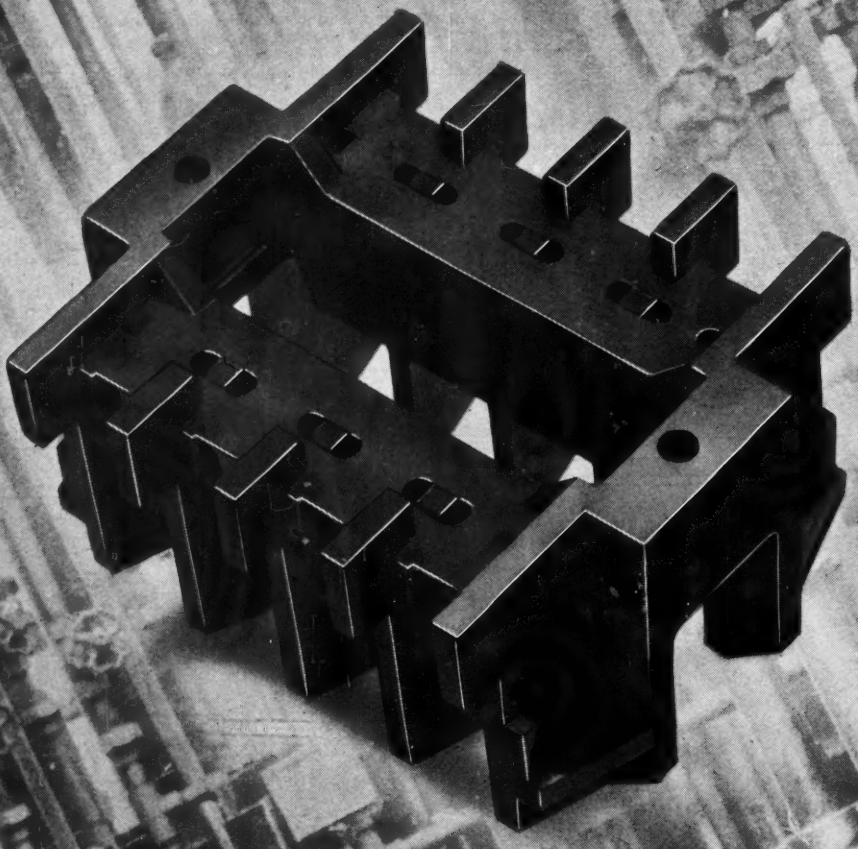
FOR
QUANTITY PRODUCTION
OF
QUALITY MOULDINGS



BIRKBYS LTD
LIVERSEDGE,
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B T-H

FRACTIONAL HORSEPOWER MOTORS

With Spigoted or Plain Endshields for direct mounting on machine-tools or other driven machines

Vertical, Horizontal, or Inclined Mounting

Sizes from $\frac{1}{6}$ H.P. to 1 H.P.
Three-phase up to 550 volts
Single-phase up to 250 volts
D.C. up to 520 volts

for "Building on" MACHINE TOOLS

There are more Fractional Horsepower Motors of BTH manufacture in use in Great Britain than of any other make.

BTH RUGBY

THE BRITISH THOMSON-HOUSTON COMPANY LIMITED, RUGBY, ENGLAND.

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SIMON-CARVES BOILER PLANTS

We were among the pioneers of the design of water cooled combustion chambers and were responsible for the first large scale installation of this type of plant.

Some of the earliest of the large steam-raising plants were installed by us and we have since carried out a large number of successful installations which are giving unique operating results both as regards high efficiency and low operating costs.

We are one of the few firms in this country who have the requisite organisation to carry through complete contracts including foundations, buildings, the whole of the steam-raising plant with all its auxiliaries, and all necessary civil engineering work.

Our tri-drum radiant heat type boiler has many exclusive features, and designs are modified to suit special conditions both as regards the types of fuel to be used and the conditions to be fulfilled.

SIMON-CARVES LTD.,
CHEADLE HEATH, STOCKPORT

FREE AID

TO REDUCE PAINTING COSTS

We can answer these questions:—

- *What plant layout is required?*
- *How many coats?*
- *Is there a correct film thickness?*
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- *Can we reduce drying time?*
- *What preparation is needed?*
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- *Is the density correct?*
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- *What type of labour is best?*

It is our long practical and technical experience we offer you, free, especially where you are handling new war-time products. Send us your problems and ask for our booklet "Modern Industrial Finishes."

On all Government approved Lists. No delivery delays. Our Chemists are authorised Government Inspectors.

DONALD MACPHERSON & CO. LTD.

21, Albion Street, Manchester, 1

and Mitcham, London.

37 MINUTES SAVED

ON ONE GRINDING OPERATION BY

Hicycle GRINDER

• • • •

A 3 ft. dia. motor end cover took 45 minutes to chip and file. The Hicycle Grinder does the work in 8 minutes.

Hicycle Portable Electric Tools are capable of maintaining production at a high level because:—

- **300% INCREASE IN POWER.**
- **INDESTRUCTIBLE ROTOR CONSTRUCTION. NO ARMATURE TO BREAK DOWN.**
- **OPERATING TIMES REDUCED BY ONE THIRD.**

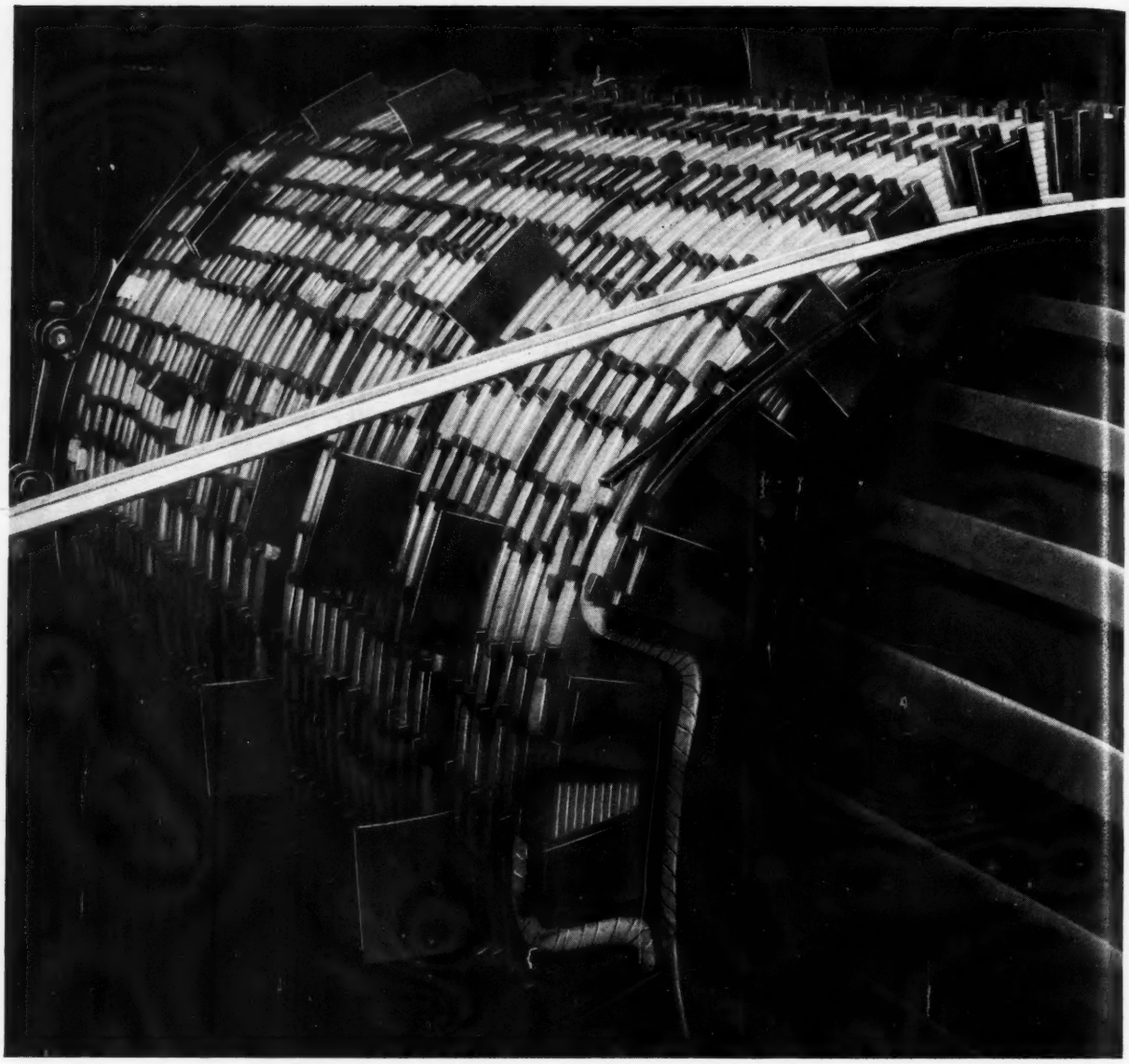
Write for particulars.

THE CONSOLIDATED PNEUMATIC TOOL CO., LTD.,

232, DAWES ROAD, LONDON, S.W.6.

Tel. Address: CAULKING, WALGREEN, LONDON. Tel. No.: FULHAM 7722

BRANCHES ALL OVER THE WORLD.



LOOK at the inter-coil insulation shown in the above illustration. Here you clearly see that thoroughness of detail characteristic of B.E.T. methods. Transformers are to a peculiar degree dependent on detail—especially insulation detail. Only the best practice is good enough and only experience can decide the best practice. B.E.T. detail reflects the exceptional experience which this, one of the foremost transformer organisations in the world, has gained. Most of the main insulation in B.E.T. Transformers is of the highest grade pressboard—the ideal insulation material for most positions in a transformer. When oil impregnated, pressboard has a dielectric constant approaching that of oil itself. The largest "Grid" transformers all have pressboard. But where the special mechanical properties of bakelite are called for, there B.E.T. use bakelite. In each position the best insulation is used for that position.

40 YEARS EXPERIENCE BEHIND THE B.E.T. CO.

Making transformers for over 40 years has evolved the best arrangement for each one of the various insulation details. Thus the spacers which separate and support the individual coils are dove-tailed so that they cannot come out under any conditions while the transformer is in service. These spacers slide freely on the axial spacers placed round the cylindrical formers which are also of pressboard. Then again, tapered packings gradually raise the inner turns to the next layer thus avoiding abrasion at the point of contact. At the crossovers pressboard interleaved with mica reinforces the carefully taped conductor at these critical points.

It will be seen that the ribs and spacers are arranged for free circulation of the oil. This care in duct design is carried throughout the transformer. Every conductor is brought into contact with the oil, the flow of which is rapid in proportion to the amount of heat generated.

All conductors are half-lap covered with the best procurable manilla paper to give double insulation and to prevent interstices.

THIS HIGH EFFICIENCY INSULATION IN EVERY B.E.T. TRANSFORMER

B.E.T. TRANSFORMERS have ALL these efficiency features

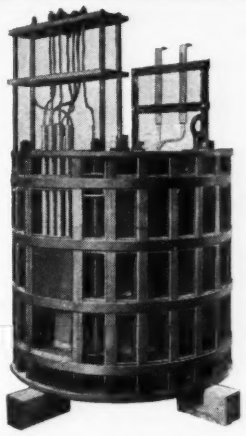
Half-lap covered insulation
Jointless windings
Dovetailed pressboard spacers that cannot come out
Tapered pressboard packings for first turns
Heavily insulated crossovers
Extra pressboard insulation for crossovers
Windings spaced for magnetic balance.
Small coils varnish protected
Insulined cores
Wood as an insulator eliminated
Oil in contact with every coil
Structural steel section frames reinforced by gussets
Core and frame a rigid unit
Inside tappings by doubled copper strip
High voltage leads in bakelite tubes between steel clamps
Low voltage leads insulated by pressboard and clamped to steel supports
Link board with non-detachable components
Tap changer contacts tested to 26 times normal rating
Shaped insulating collars keep end turns in place
Cable boxes have large expansion and filling chamber and are designed for easy connecting
Terminal stems pinned to prevent turning
Welded steel tanks tested for hot oil tightness
Tanks scientifically finished to prevent corrosion
Flush oil gauges protected against leakage and breakage

TRANSFORMERS FOR EVERY INDUSTRIAL PURPOSE

The B.E.T. Company make every size and class of transformer from the smallest instrument type to the largest sizes for distribution purposes. In addition to the core-type transformer they manufacture the "Berry Radial" Transformer of which they were the pioneers. Both types have been adapted to almost every industrial and other purpose. When next you have a transformer problem, enlist this exceptional experience. A B.E.T. engineer will gladly call at any time convenient to you.

THE OLDEST RADIAL TRANSFORMER—1896

When The B.E.T. Comf any commenced in 1896 they introduced the "Berry" Radial Transformer—a notable improvement in the practice of that time and still unrivalled for air-cooling and where silence is a consideration. The symmetrical form allows absolutely even cooling of all parts. Illustrated is the oldest radial transformer in existence.



. . . AND A MODERN B.E.T. RADIAL

B.E.T. Radial Transformers are now manufactured for oil cooling in sizes up to 10,000 kVA per phase and for air-cooling in sizes up to 500 kVA per phase. Here is a 2,000 kVA single phase 50 cycle ON transformer for 20,000/3,820 volts. The original design proved so sound that a modern radial does not differ in its essentials. But in the details one can see the evolution that 40 years experience has produced.

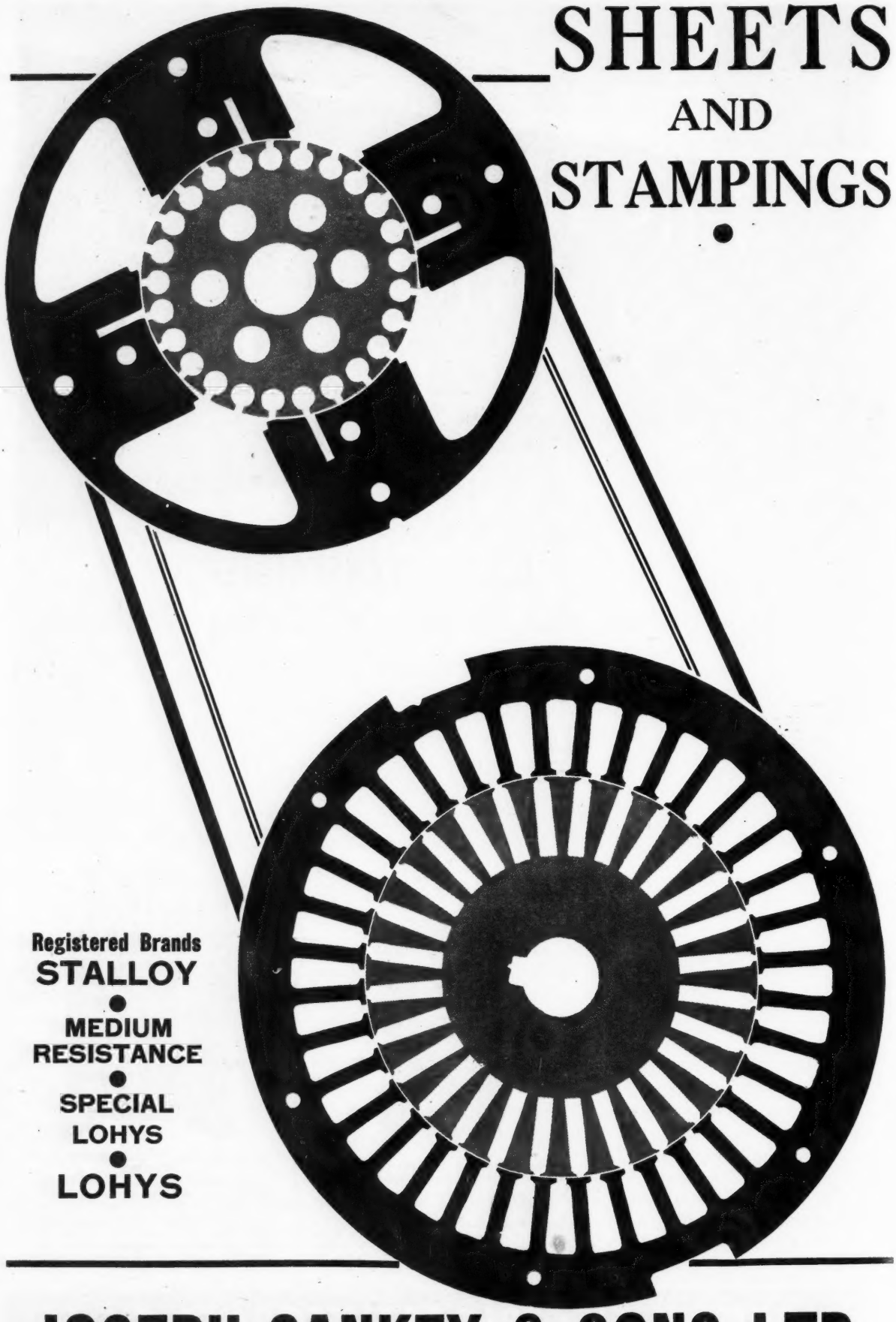
The BRITISH ELECTRIC TRANSFORMER Co., Ltd.

Telephone: Hayes 70 — Hayes, Middlesex — Telegrams: Transfundo, Hayes

in association with

CROMPTON PARKINSON LTD.

SHEETS AND STAMPINGS



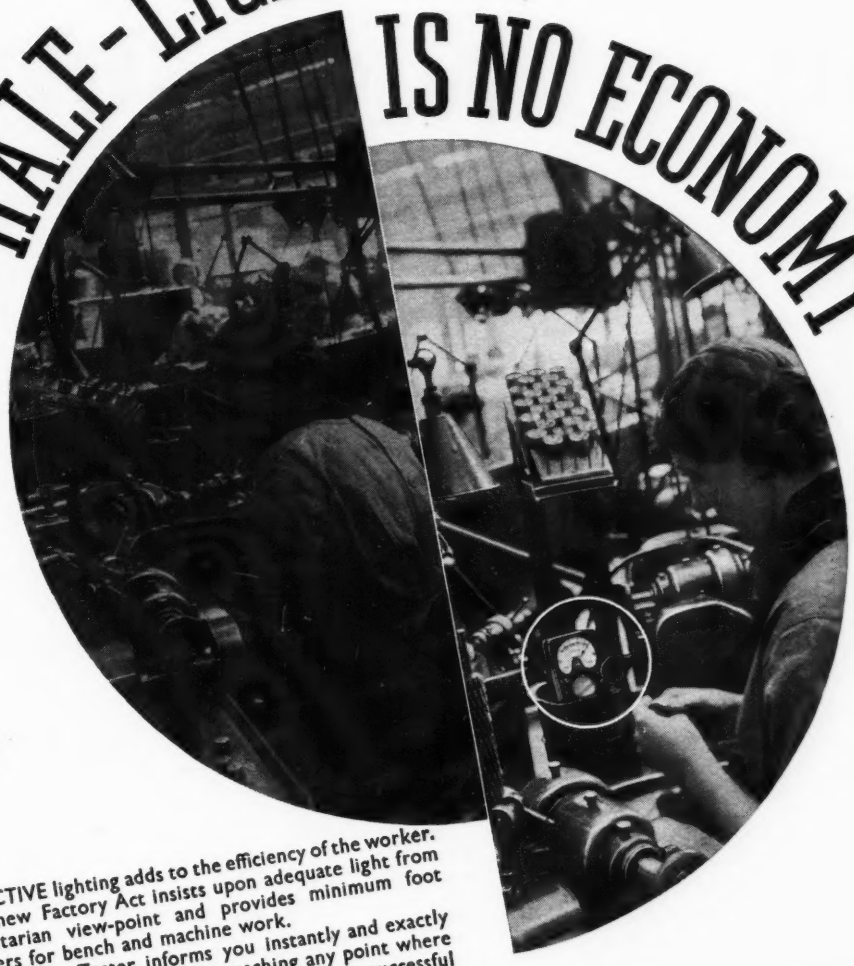
Registered Brands
STALLOY
•
MEDIUM RESISTANCE
•
SPECIAL LOHYS
•
LOHYS

JOSEPH SANKEY & SONS LTD.

LONDON OFFICE: 168, REGENT STREET, W.1

BILSTON

HALF-LIGHT IS NO ECONOMY



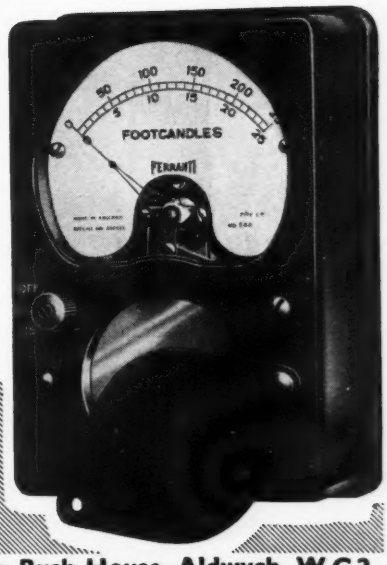
EFFECTIVE lighting adds to the efficiency of the worker. The new Factory Act insists upon adequate light from the humanitarian view-point and provides minimum foot candle powers for bench and machine work. The Ferranti Light Tester informs you instantly and exactly the amount of light in foot-candles reaching any point where it is placed. It is to-day an essential accessory in successful Works Management. Ranges 0 – 25 – 250 Candles . . . changed without the aid of any additional fittings.

Write for list IN.12 and Table of Light Values.

F143

FERRANTI

Light Tester



FERRANTI LTD., HOLLINWOOD, LANCS. **London Office: Bush House, Aldwych, W.C.2.**

In these difficult times you cannot go wrong if you RECOMMEND

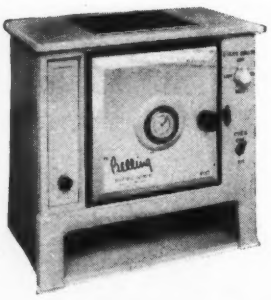
THE BABY 'Belling' COOKER

Still the best value for money

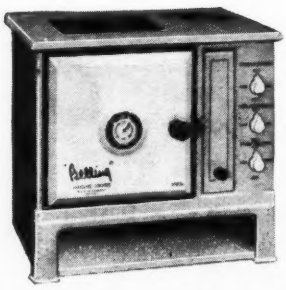
Still the most economical

Still the same quality

Still the same cooker



THE BABY 'BELLING'. Still the best value for money on the market and still has the largest sales. The public's need for economy in buying and cooking makes this cooker (and the 40A) more popular than ever. Price **£4.19.6** (Plus 15%)



THE '40A'. This cooker is a larger edition of the Baby 'Belling'. Has an even larger oven and in addition to the boiler-griller, the hob is fitted with a separate three-heat boiling plate.
Price **£6.9.6** (Plus 15%)

SEND FOR ILLUSTRATED LEAFLETS

★ DELIVERY FROM STOCK ★

BELLING & COMPANY LIMITED, BRIDGE WORKS, ENFIELD, MIDDLESEX. TELEPHONE: HOWARD 1212 (7 lines)

London Showrooms: 313, Regent Street, W.1. Glasgow Depot: 113, Waterloo Street. Swansea Depot: 21-22, Park Street

C.R.C.291

A SOLON MODEL
for specialised work

Almost every variety of work is covered by one of the standard Solon Electric Soldering Irons specially designed for industrial use. The illustration shows the 65 watt "pencil" bit, actual size. All Solons for industrial use are subjected to a pressure test of 600 volts to earth for one minute and conform to Home Office requirements. All connections safe from heat and corrosion in the bakelite terminal box. Complete with 6 feet of HENLEY tough rubber-sheathed 3-core flexible. Made for the following standard voltages: 100/110, 200/220, 230/250.

Made in England by
W. T. HENLEY'S TELEGRAPH WORKS CO., LTD.,
(18/D), Engineering Sales Department,
GRAVESEND, KENT.

OTHER STANDARD 'SOLON' MODELS

These diagrams show the shapes (much reduced) of other models in the Solon range. There are 240, 125 and 65 watt industrial Solons, also a 65 watt model suitable for domestic use.

WRITE FOR LEAFLETS

SOLON TRADE MARK *Electric*
SOLDERING IRON FOR INDUSTRIAL USE

LIGHTING *and* OUTPUT

24 HOURS A DAY, 7 DAYS A WEEK, SHIFT AFTER SHIFT VIE WITH EACH OTHER IN INCREASING OUTPUT OF ESSENTIAL MATERIAL

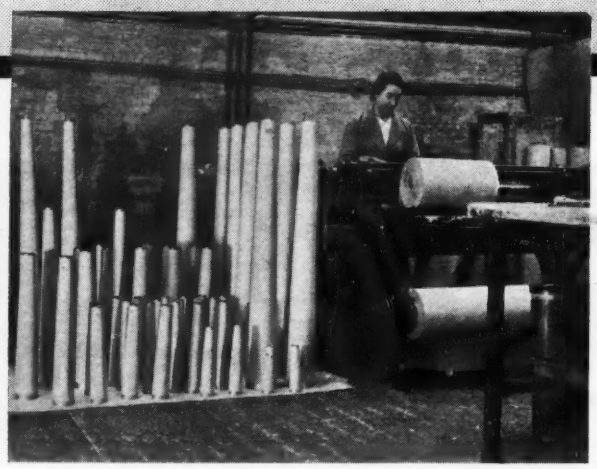
FOR THIS INTENSIVE EFFORT
GOOD LIGHTING
IS MORE THAN EVER ESSENTIAL

Sell
SIEMENS
"COILED-COIL" LAMPS
(MADE IN ENGLAND)
for Abundant Light with Economy

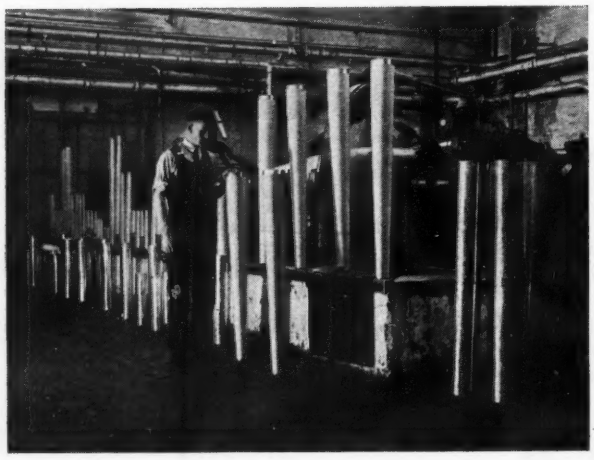
OTHER QUALITY PRODUCTS
"SIERAY" ELECTRIC DISCHARGE LAMPS
ELECTRIC APPLIANCES.
"FULL O'POWER" BATTERIES for Radio Sets, Torches, etc.
V.I.R. CABLES and WIRES
METERS. Demonstration and House Service.
L.T. SWITCH AND FUSEGEAR

Advt. of SIEMENS ELECTRIC LAMPS AND SUPPLIES LIMITED, 38/39 Upper Thames Street, London, E.C.4
Branches at-Belfast, Birmingham, Bristol, Cardiff, Dublin, Glasgow, Leeds, Liverpool, Manchester, Newcastle-on-Tyne, Nottingham, Sheffield, Southampton

CONDENSER CONES



Condenser Cones being wound.



Cones ready for drying and impregnating.
The tin canisters are for storing the finished cones in oil.

CONDENSER Cones for the electrical reinforcement of cable ends are being manufactured in rapidly increasing quantities. There is a complete range of standard sizes to cover all requirements.

The illustrations show two stages in the manufacture of Condenser Cones.

Our bulletin "The Condenser Cone" will gladly be sent upon request.

Standard Telephones and Cables Limited

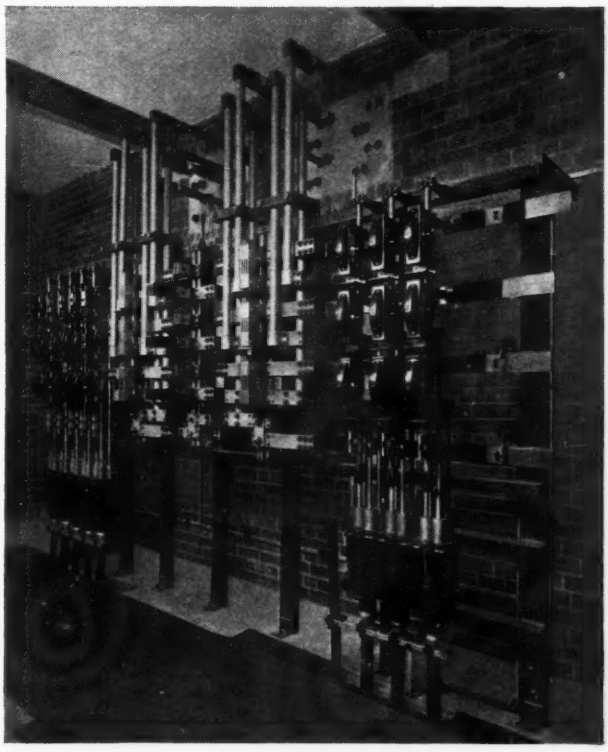
NORTH WOOLWICH, LONDON, E.16

Telephone: Albert Dock 1401

FUSEGEAR

Install "English Electric" and be Safe

TYPE "U35"
LOW TENSION
DISTRIBUTOR UNITS
FOR SUBSTATIONS, FACTORIES, AND OTHER INSTALLATIONS



The illustration shows a typical "U35" board comprising:

2-3000 amp. Transformer Link Units.

1-2000 amp. Busbar Section Unit.

5-500 amp. Distributor Units.

4-300 amp. Distributor Units.

2-Spare Ways.

Installed at Nelson Court Transforming Station, Bradford Corporation.

Available in ratings of 300, 500, and 800 amperes in any arrangement from single-phase and neutral to three-phase and neutral. All units incorporate "English Electric" High Rupturing Capacity, Non-Deteriorating Cartridge Fuse Links, Indicating Type.

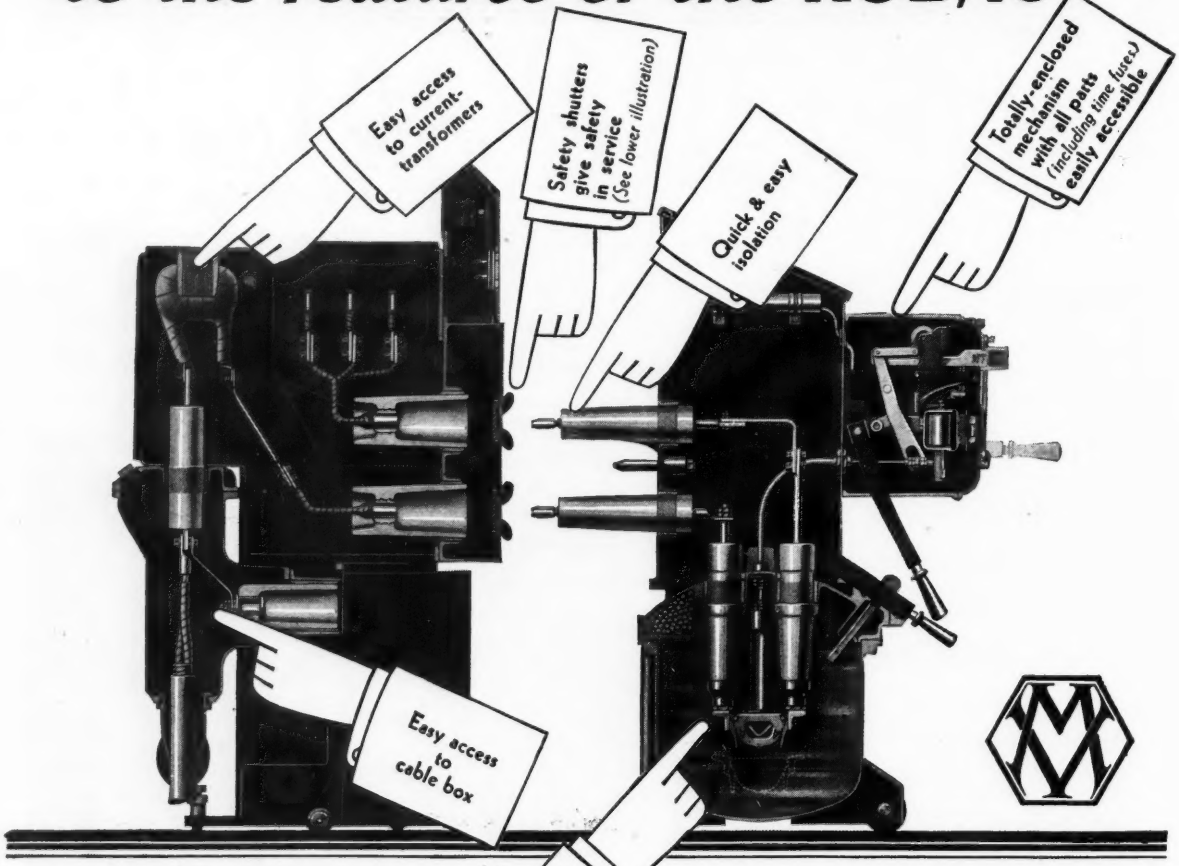
Write for full particulars and publications to :—

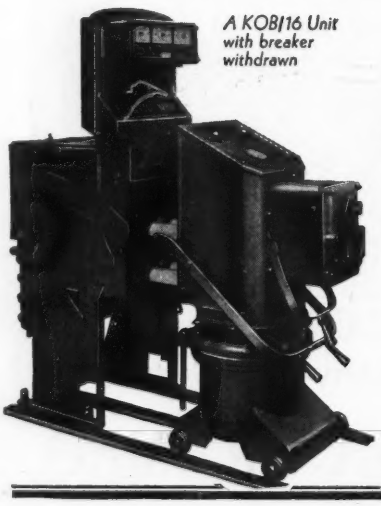
THE ENGLISH ELECTRIC COMPANY LIMITED

London Office : QUEEN'S HOUSE, KINGSWAY, LONDON, W.C.2

FUSEGEAR WORKS - - - - STAFFORD

It's not rude to point
-to the features of the KOB/16


Easy access to current-transformers
Safety shutters give safety in service (See lower illustration)
Quick & easy isolation
Totally-enclosed mechanism with all parts (including time fuses) easily accessible
Easy access to cable box
Rolling butt contacts ensure all arcing occurs on tips. Contacts easily changed without special skill.



A KOB/16 Unit with breaker withdrawn

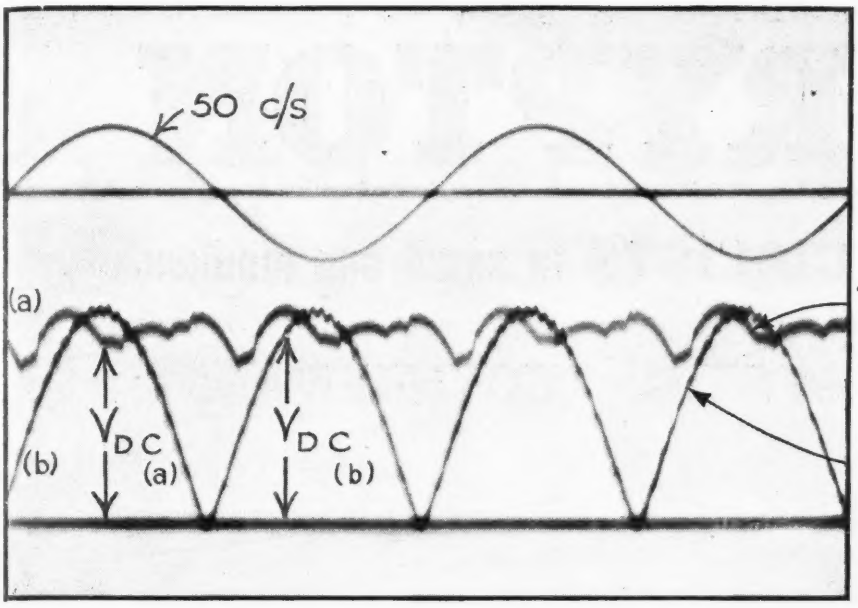
METROVICK METAL-CLAD SWITCHGEAR

Type KOB/16 — up to 11 kV, 150 MVA.
Short-circuit tested to BSS116/1937.
Convenience in operation . . . . . .
Safety in service . . . . . .

METROPOLITAN Vickers ELECTRICAL CO., LTD.
TRAFFORD PARK ··· MANCHESTER 17.

F/K902

Switch to COSMOS LAMPS



UNSMOOTHED RIPPLE 10%

OF THE MEAN D.C. VOLTAGE AS COMPARED WITH 50% FOR A NORMAL SINGLE-PHASE RECTIFIER

An important feature of the new Westinghouse "NOREGG" constant potential system, for use without batteries, is its ease of smoothing. The circuit is so arranged that, at full load, the secondaries of the mains transformer provide a 3-phase system. The output at full load is of the same order and frequency, therefore, as a normal 3-phase rectifier (about 10% at 300 c.p.s.) whereas a normal single-phase rectifier would have a ripple percentage of about 50% at 100 c.p.s. The increase in frequency improves the effectiveness of the filter circuit by 9 times, while, since the initial ripple is 1/5th of the single-phase supply, the output of the "Noregg" becomes 45 times as easy to smooth. The output voltage wave at full load is shown by oscillogram (a) and should be compared with the output voltage wave of a normal single-phase rectifier as shown by oscillogram (b).

Full details of the "Noregg" system, and the "Westat" which is for use with batteries, are given in new descriptive pamphlet No. 11 L, a copy of which may be obtained from Dept.E.R.

WESTINGHOUSE

"NOREGG" CONSTANT POTENTIAL SYSTEM

for use without batteries.

"WESTAT" for use with batteries.

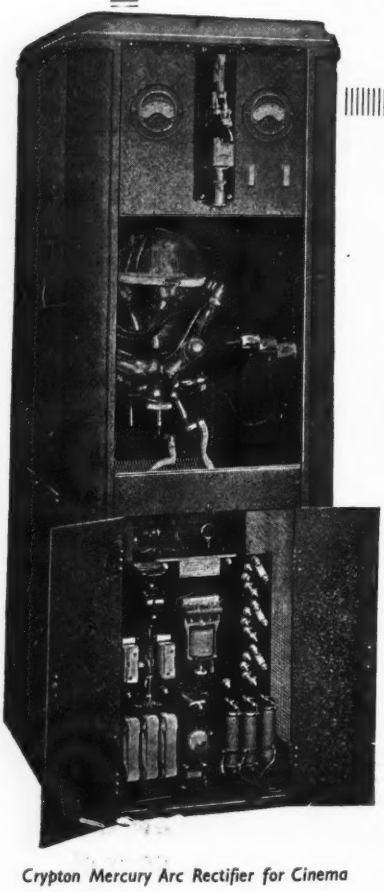
WESTINGHOUSE BRAKE & SIGNAL CO. LTD., PEW HILL HOUSE, CHIPPENHAM, WILTS.

B

CRYPTON

SPECIALISTS in small and medium

STATIC RECTIFIERS



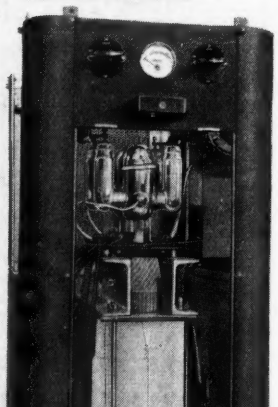
Crypton Mercury Arc Rectifier for Cinema Projector Arcs.

for
- Battery Charging
- Emergency Lighting
- Cinema Projection
- Lift Control
- Magnetic Apparatus
- D.C. Power Supply

Crypton specialise in all types of small and medium size Rectifiers of outputs from 0·25 watts up to 50 kW.

The range includes both Metal and Glass Bulb Rectifiers.

A series of fully illustrated and descriptive technical catalogues are available, copies of which will be sent free on request.



Crypton Valve Rectifier for D.C. Power Supply from Three Phase A.C. Mains.

CRYPTON EQUIPMENT LTD.

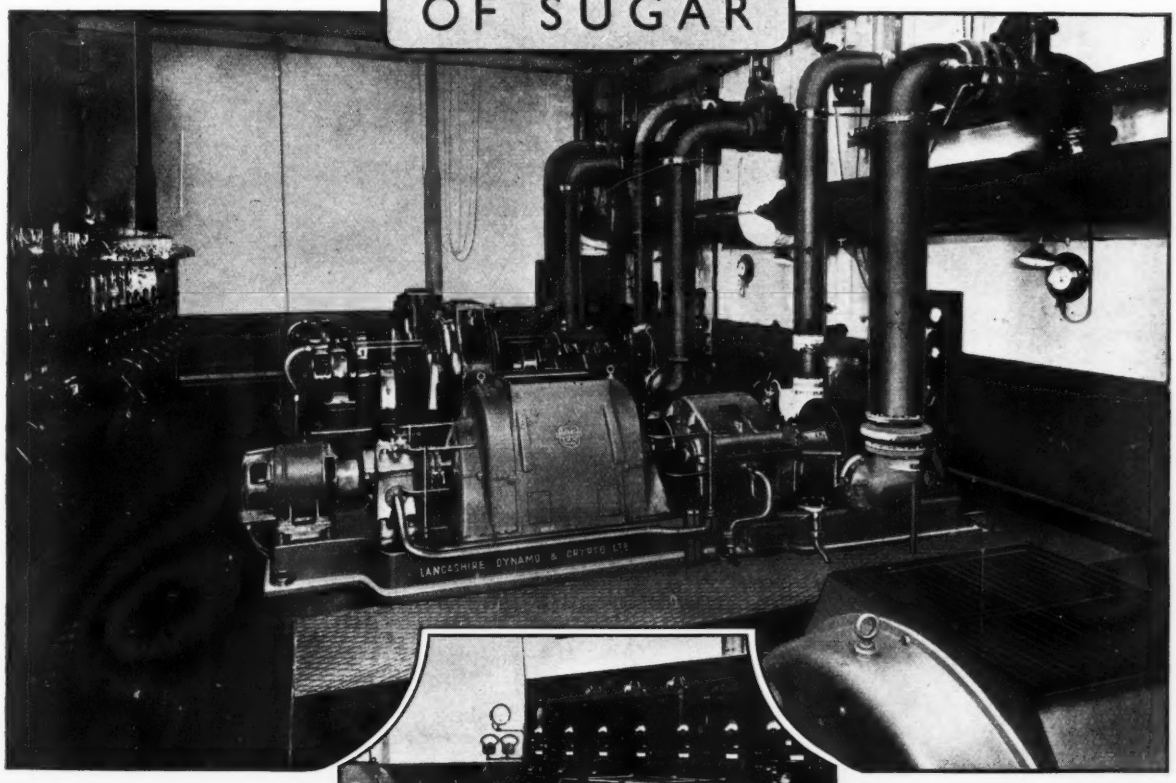
NORTH ACTON ROAD • PARK ROYAL • LONDON, N.W. 10 • TELEPHONE: WILLESDEN 2272/5

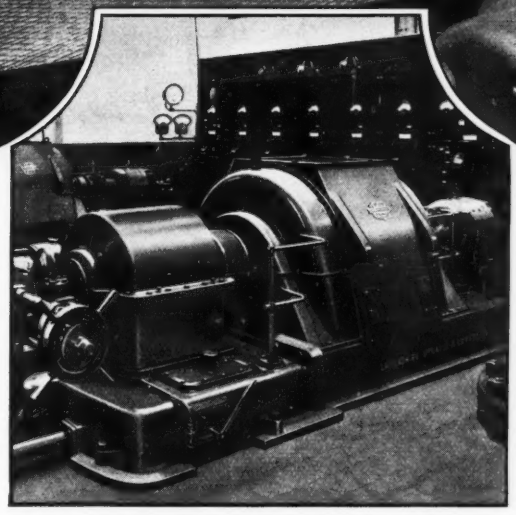
Associated Companies: Lancashire Dynamo & Crypto Ltd., Foster Transformers & Switchgear Ltd.

GA 9314

LANCASHIRE CRYPTO LDC

ELECTRIC PLANT ENSURES WAR SPEED PRODUCTION OF SUGAR





(*Top*) In the foreground are the additional two L.D.C. Turbo-Alternators, 1,150 kW, installed at the Ipswich plant of the British Sugar Corporation for giving increased production at "War Speed."

(*Bottom*) Another view of the above L.D.C. Turbo-Alternators driven by back-pressure turbines designed for 290 lb. per sq. inch steam pressure at 550 deg. F. and 30 lb. per sq. inch back-pressure.

Owing to the necessity of conserving shipping, the production of home-produced Beet Sugar has had to be increased and maintained at "WAR SPEED" level, as Sugar is an essential 'munition' of energy and health. The largest producer of Beet Sugar in Great Britain is the British Sugar Corporation and it is not without significance that L.D.C. motors and alternators are in use at the following plants of the British Sugar Corporation:—

Bury St. Edmunds, Ely, Felstead, Cupar, Ipswich, Kelham, Kings Lynn, Peterborough, Wissington, Bardney, Brigg, Selby, Cantley, Newark & Kidderminster.

There are also hundreds of L.D.C. machines in use in the sugar refineries in Great Britain.

WORKS: WILLESDEN, LONDON, N.W.10

LANCASHIRE DYNAMO AND CRYPTO LTD

WORKS: TRAFFORD PARK, MANCHESTER, 17

Associated Companies:—FOSTER TRANSFORMERS & SWITCHGEAR LTD., WIMBLEDON—CRYPTON EQUIPMENT LTD., WILLESDEN

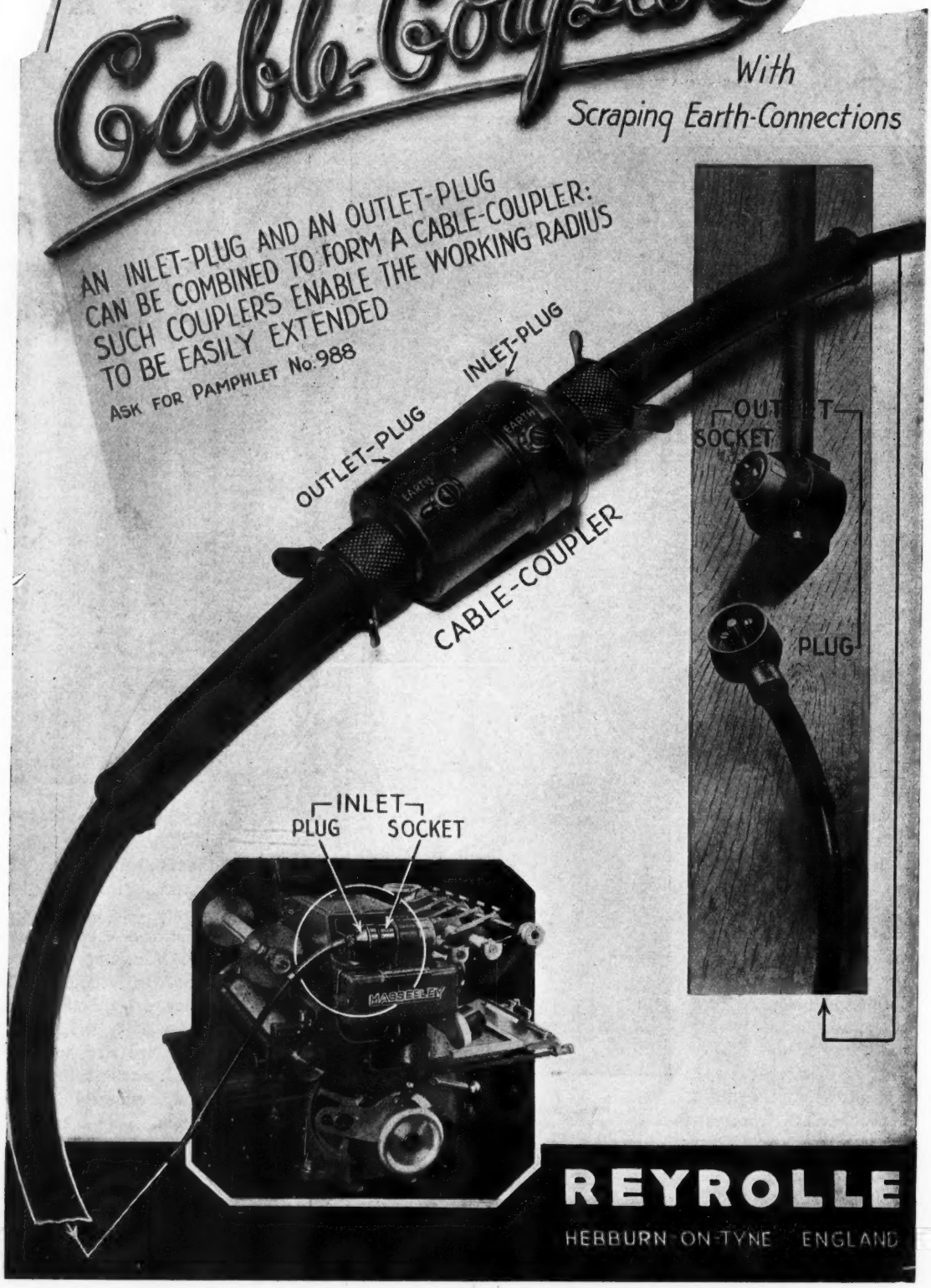
Metal-Clad

Cable-Couplers

With Scraping Earth-Connections

AN INLET-PLUG AND AN OUTLET-PLUG CAN BE COMBINED TO FORM A CABLE-COUPLER: SUCH COUPLERS ENABLE THE WORKING RADIUS TO BE EASILY EXTENDED

ASK FOR PAMPHLET No. 988



REYROLLE

HEBBURN-ON-TYNE ENGLAND

'ARMACELL' 'OHMALINE' 'INSULDERM' 'PAKYDERM'

GRIFFITHS

FOR

Reliable

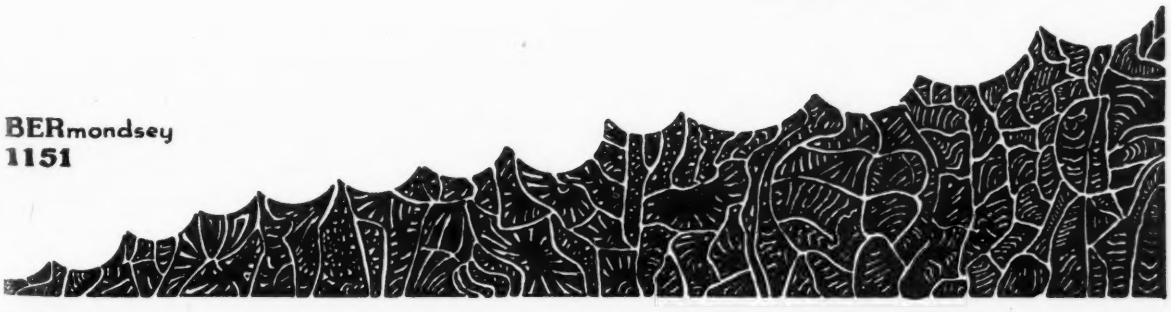
INSULATING VARNISHES

AND

INDUSTRIAL FINISHES

GRIFFITHS BROS. & CO. LONDON LTD.
Paint, Enamel and Varnish Specialists
Macks Road, Bermondsey
LONDON, S.E.16.

BERmondsey
1151



SOLE MAKERS OF THE ORIGINAL 'BALLOON' BRAND 'ANTI-SULPHURIC' ENAMEL

You get it ALL in EKCO Lamps

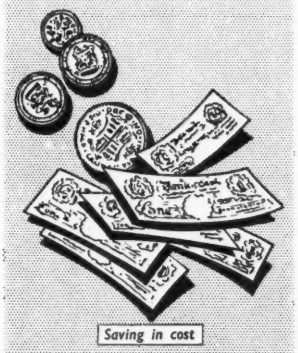
The new 'big name' in lamps —with a trading policy that is original, that means better business with bigger profits.

- ★ TOP-QUALITY LAMPS
- ★ FULL B.S.I. SPECIFICATION
- ★ ALL POPULAR RANGES
- ★ QUICK-SELLING PRICES
- ★ BIG-PROFIT DISCOUNTS
- ★ ADDED BONUSES AND REBATES
- ★ 'SIRIUS' FOR SHILLING-MARKET

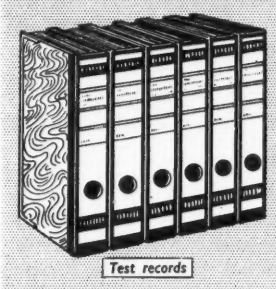
If you sell lamps, if you buy lamps in bulk, you can profit by writing for full details to

Lamp Dept., E. K. Cole, Ltd., Ekco Works, Southend-on-Sea

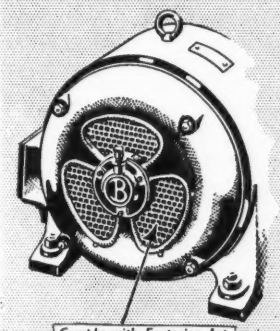
Points in Brook Manufacture



Saving in cost



Test records



Comply with Factories Act

55 Some of the first Brook motors were paid for from the **saving in cost of current**, over the machines they replaced. **Low running cost** has always been the first consideration in the design of Brook motors.

56 There is a filed record, available to the user, of the **complete test** of **every** Brook motor ever made.

57 Brook Motors Limited were the first firm to modify all their machines **to comply fully** with the Factories Act of 1937. It is impossible to come in contact with any internal moving part in a Brook motor.

58 The order system in use ensures **fifteen** independent checks that the motor supplied is exactly to requirements.

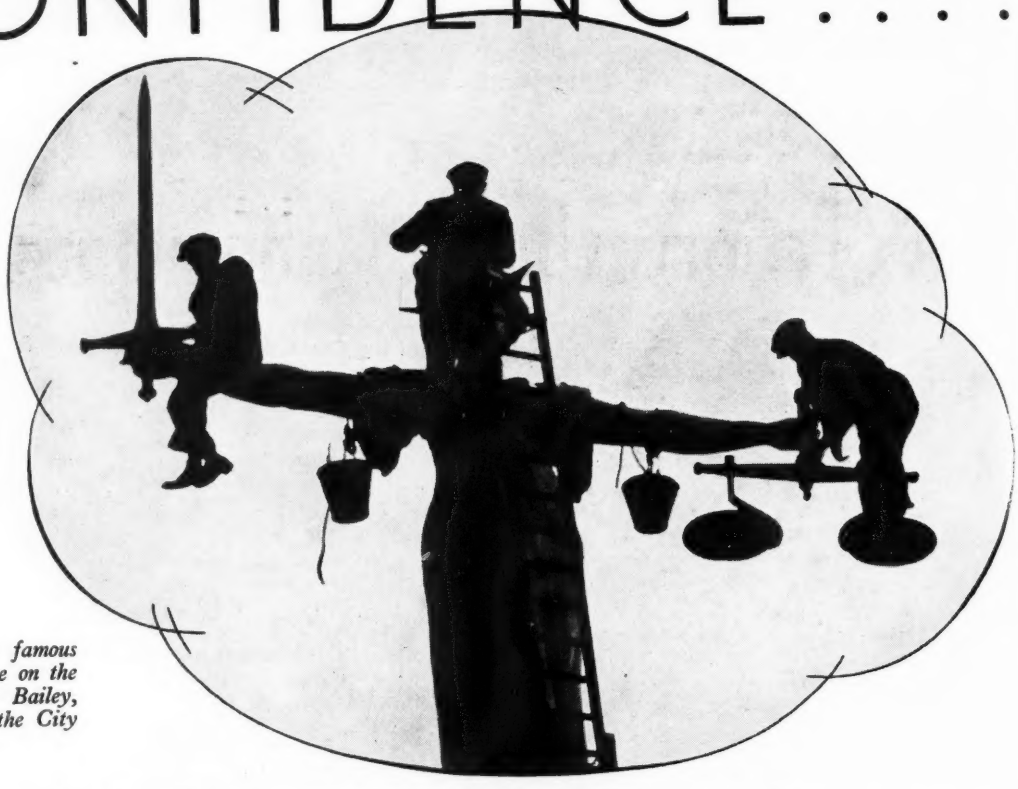
59 A shaft key is supplied without charge on request.

BROOK MOTORS

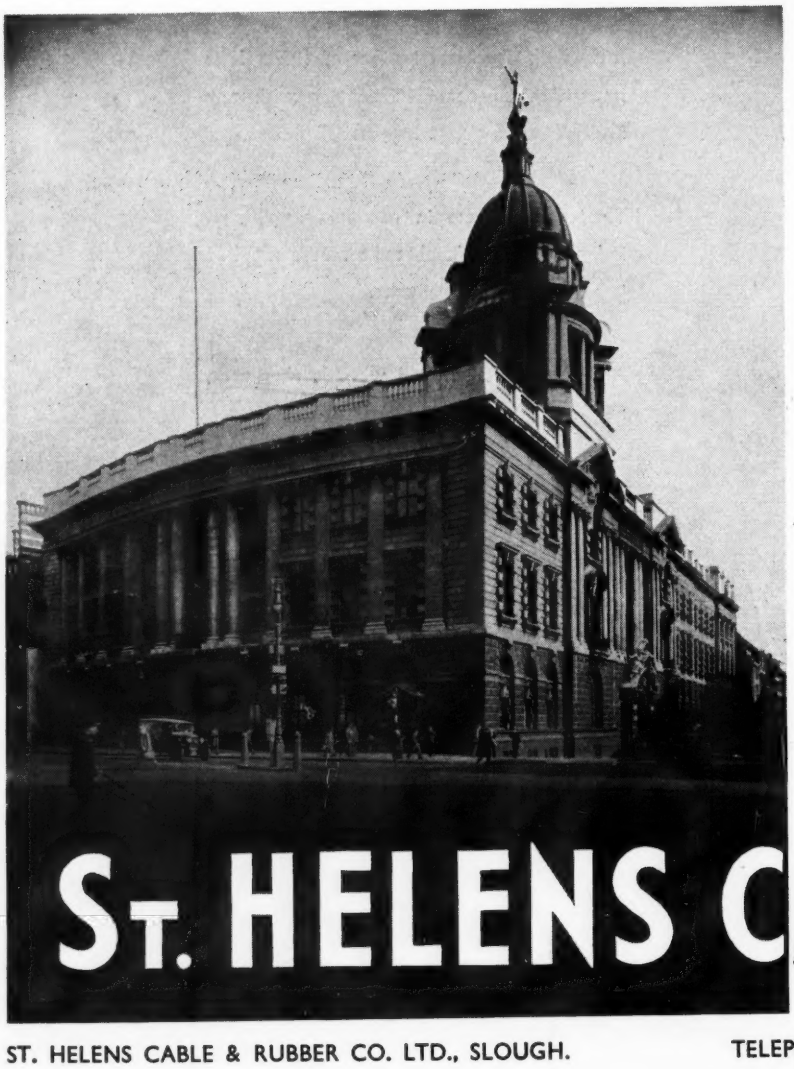
LIMITED

EMPRESS WORKS - HUDDERSFIELD

CONFIDENCE....



Cleaning the famous statue of Justice on the dome of Old Bailey, towering over the City of London.



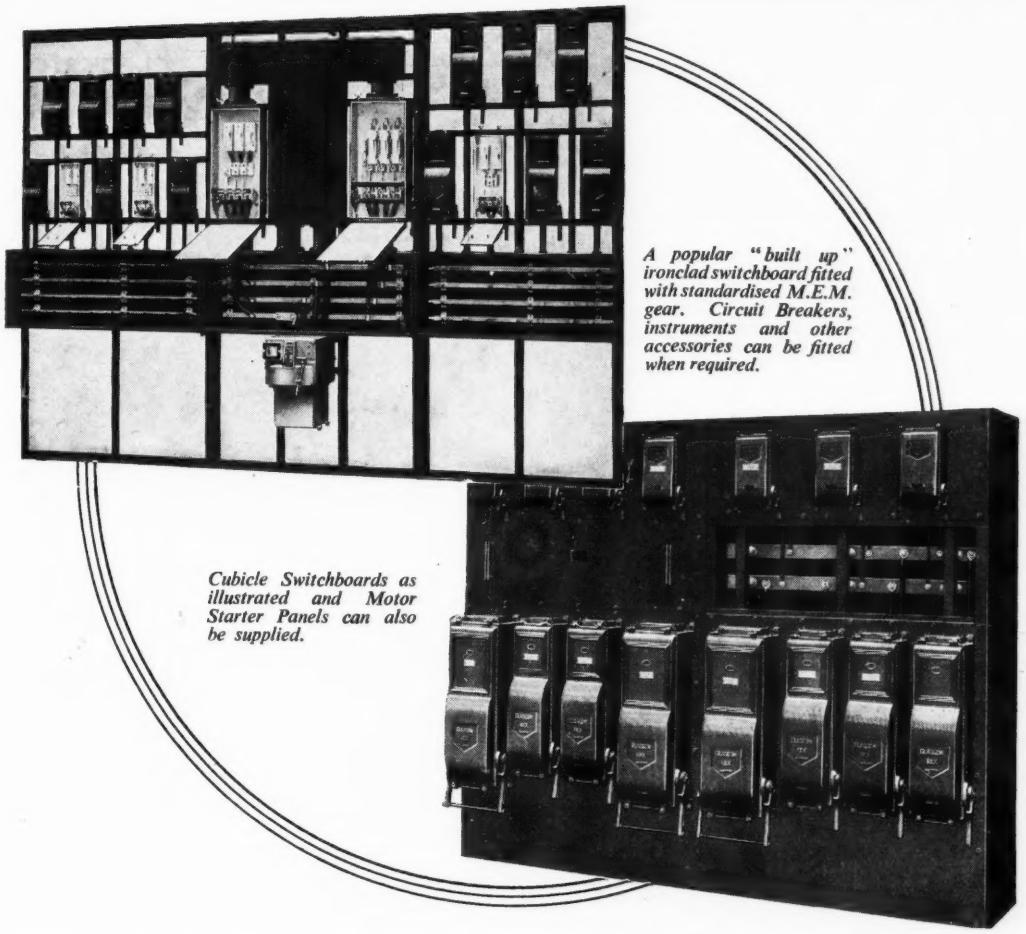
Confidence in men or materials springs from knowledge—knowledge of the existence of essential qualities.

If you have had experience of St. Helens Cables in the past, you will know that—

YOU CAN TRUST ST. HELENS CABLES

ST. HELENS CABLE & RUBBER CO. LTD., SLOUGH. TELEPHONE: SLOUGH 20333 (5 LINES)

Expert service for your *Special* switchgear requirements



A popular "built up" ironclad switchboard fitted with standardised M.E.M. gear. Circuit Breakers, instruments and other accessories can be fitted when required.

Cubicle Switchboards as illustrated and Motor Starter Panels can also be supplied.

M.E.M. has long been famous for the high quality and low price of its standardised switchgear. But there is also a well-organised M.E.M. service available to those requiring special equipment—composite panels, specially designed switches, etc., etc.

This means that by coming to M.E.M. with your special requirements you get the best of two policies—standardisation carried as far as it can be carried and individual treatment where required. To take advantage of the wide experience of M.E.M. engineers in designing and estimating your special requirements will cost you nothing.

M·E·M

MIDLAND ELECTRIC MANUFACTURING CO., LTD., TYSELEY, BIRMINGHAM, 11

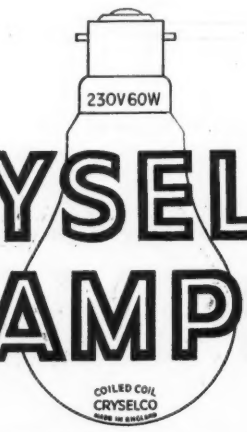
London Showrooms & Stores : 21-22, Rathbone Place, London, W.1. Manchester Showrooms & Stores : 48-50, Chapel Street, Salford, 3

Specialists in Switch, Fuse and Motor Control Gear. Manufacturers of High Efficiency Electric Fires.

LIGHT THROUGH THE AGES

The Linkman

In the days before the advent of street lighting and proper roads, the well-to-do travelled in sedan chairs and employed linkmen who carried torches, made of resinous materials, to light the way.

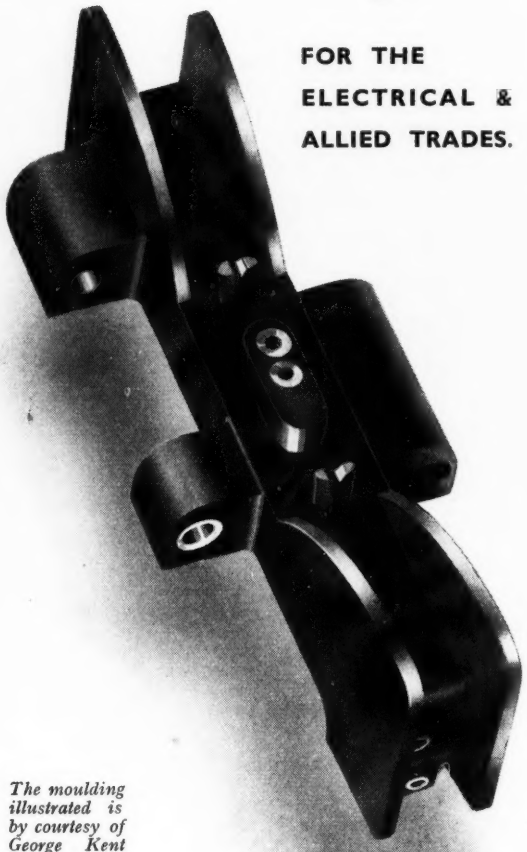


CRYSELCO LAMPS

CRYSELCO LTD.
KEMPSTON WORKS · BEDFORD
and at BIRMINGHAM, BRIGHTON, CARDIFF, GLASGOW, LEEDS, LEICESTER, LIVERPOOL, MANCHESTER, LONDON

Perfect Mouldings

FOR THE ELECTRICAL & ALLIED TRADES.



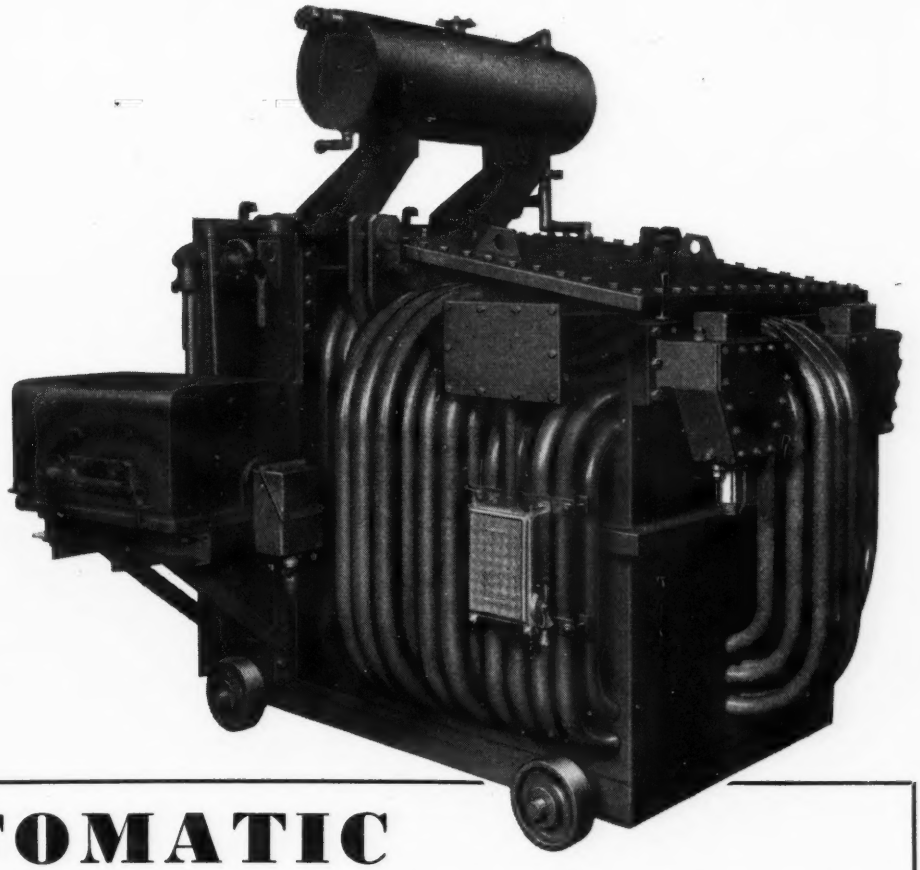
The moulding illustrated is by courtesy of George Kent Ltd., Luton.

Send us your enquiries. A Technical Representative will be pleased to call and discuss mouldings with you.

DESIGN · MOULD MANUFACTURE · RESEARCH · MOULDING

Moulded Products Ltd
CHESTER RD · TYBURN · BIRMINGHAM

ONE OF THE J.&P. PAGES



AUTOMATIC VOLTAGE CONTROL

Fluctuation of voltage is undesirable both to the supply authority and to the consumer. The 3-phase, 50 cycle, automatic booster illustrated here provides a maximum boost of 1,070 volts. It also maintains a balanced 3-phase line to line pressure on the outgoing side of the regulator of 10,914 volts, when the incoming supply varies between 9,844 and 10,700 volts with a constant outgoing current of 183 amps.

A brief specification.—The equipment consists of a regulating auto-transformer, and a series booster transformer, both contained in one tank. The regulating transformer is equipped with a 3-phase star connected tertiary winding giving 5 kVA, 400 volts, 3-phase for a local supply for the purpose of operating the electrically controlled on-load tap-changing switch. The tank is fitted with a conservator, dehydrating oil sealed breather, and cable boxes in and out. A weatherproof switch fuse is provided for controlling the auxiliary 400 volt circuit.

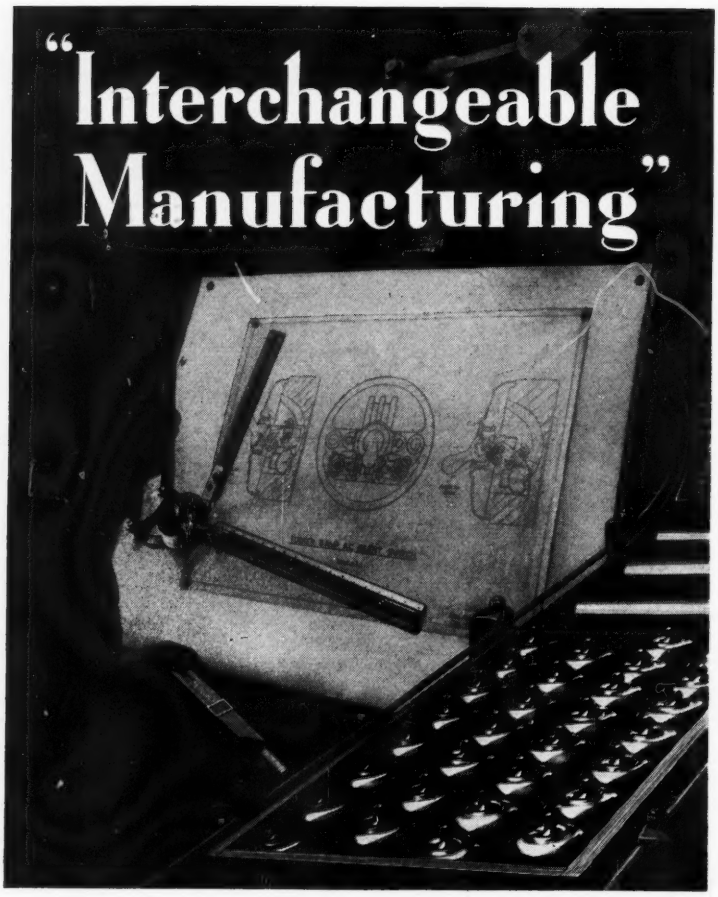
Control is fully automatic with alternatively push button operation. The equipment can be operated by hand in case of emergency.

The separate control panel for mounting at a distant point is provided with a reverse power relay.

JOHNSON & PHILLIPS LTD.

Charlton, London, S.E.7

The mark that means that "little more" in quality



of

TUCKER "Telaccessories"

for PRECISION ASSEMBLY, starts with DESIGN

Designing for TUCKER Interchangeable Manufacturing is not limited to the technical specification alone, but envisages and plans for bulk manufacture and assembly and covers the issue of strict specifications for materials.

Such perception in design ensures proper relationship between all components, so that assembly is efficiently effected and the final product functions efficiently and with reliability.

Tucker TELAC

J. H. TUCKER & CO., LTD., KINGS ROAD, TYSELEY, BIRMINGHAM, 11

2, Newman Street, LONDON, W.1. 17, Bothwell Street, GLASGOW, C.2. 41, Donegall Place, BELFAST. 47, Dawson Street, DUBLIN, C.2.

Agents in DURBAN : Associated Engineers Co., Ltd., 599, West Street, Durban.

Specify and use—

PIRELLI GENERAL
RUBBER INSULATED
Cables
Made at Pirelli-General Cable Works.

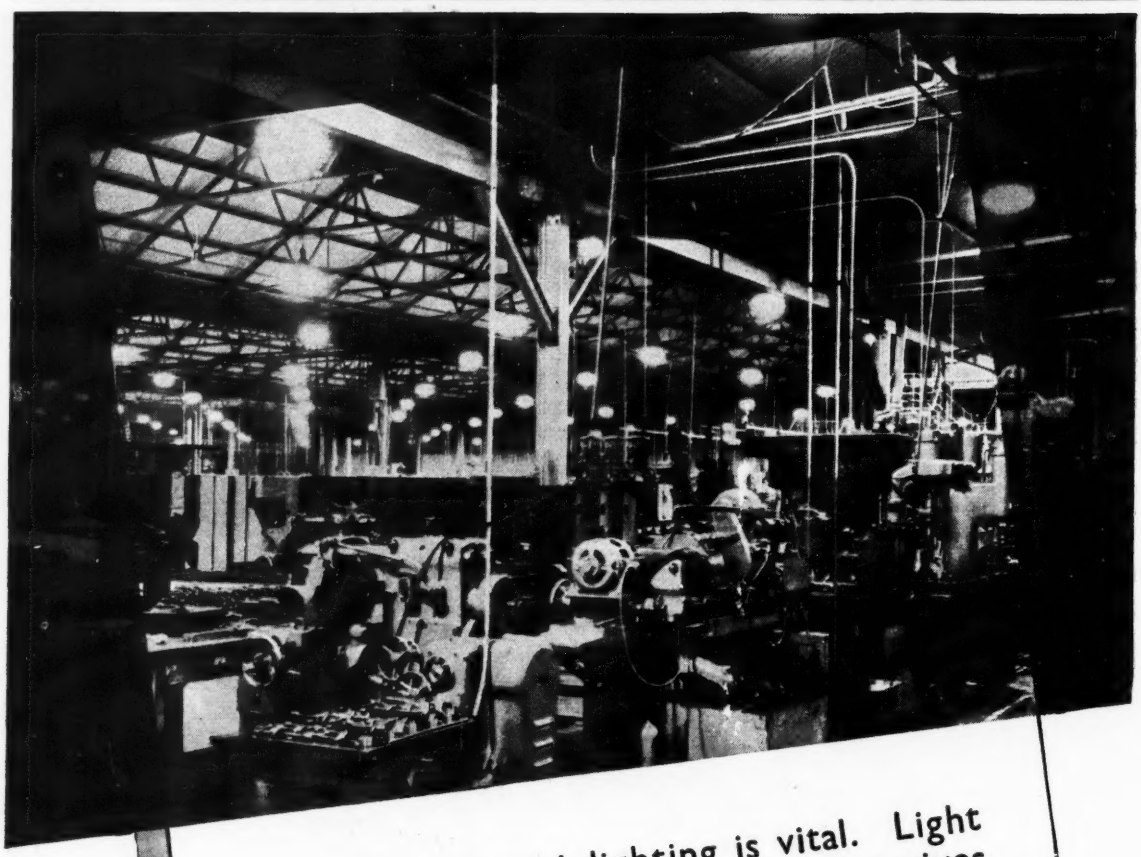
NATIONAL EMERGENCY
Please assist by saving all packing material for collection when our van calls.

Get it from the G.E.C.

Copyright Colonel Sir Thomas F. Purves Exclusive Licensees Members of the C.M.A.

Advt. of The General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.

LIGHT-CONDITIONING



In war-time, good lighting is vital. Light Conditioning with B T H Equipment gives to workers a feeling of security, well-being and cheerful efficiency which, in itself, is worth a multitude of "welfare" aids. The advice of B T H experts is freely at the service of any engineer who desires information on Light Conditioning.

Write or phone for an appointment and a copy of Mazdalux Industrial Lighting Equipment Catalogue.

B T-H
REG. TRADE MARK

3866

MAZDA, MERCRA & SODRA LAMPS WITH MAZDALUX FITTINGS

THE BRITISH THOMSON-HOUSTON CO. LTD., CROWN HOUSE, ALDWYCH, LONDON W.C.2 (TEMPLE BAR 8040)

FANS

· FROM STOCK ·

STANDARD SUPPLY AND FINISH

£1 - 16 - 0 List

THE "MODERN" DESK FAN
With 8in. Blades, A.C. Single Phase, 50 cycles.
Consumption 20 watts (approx.).
Desk Mounting.

Portable, weighs only 3 lbs. 6 ozs.
Ideal for HOME
OFFICE or
WORKSHOP

VERITYS LTD., ASTON, BIRM'HAM, 6

Sales Headquarters: BRETTENHAM HOUSE, LANCASTER PLACE, W.C.2.

DUSTS GREATEST ENEMY

MARTINDALE SUPER BLOWER

MARTINDALE

● The Pioneer of British Blowers!

A clean factory means improved health and greater production capacity for work people. The removal of dust will also prevent motor failures and will ensure longer life for bearing surfaces. The Martindale Super-Blower, with or without suction attachments, is easily carried about the factory and is built for lasting service. Thousands now in use all over the world.

10 days free trial

MARTINDALE ELECTRIC COMPANY LTD
Westmorland Road, London, N.W.9

SPECIAL NOTICE—Mica Undercutting and Commutator Slotting
We hold comprehensive stocks of Saws and Cutters for "U" and "V" slots —Saws from ¼" to 1¼" outside diameter in 14 standard thicknesses, .015" to .045"—"V" Cutters from ½" to 1½" outside diameter with 40°, 50° and 60° cutting angles. Delivery against priority.

GO TO IT!

We are tempted to make as much use as possible of this precious piece of paper by filling it with a necessarily long story of the range and merits of our electric motors; but we haven't time to write this story and you wouldn't have time to read it. We could cover the page with a large picture; but that would necessitate a block containing enough copper for several cartridge cases. So we shall save time and material all round by using a small stock block and signing ourselves.

Yours faithfully
but in haste,

LAURENCE, SCOTT & ELECTROMOTORS LTD

ELECTRIC MOTOR MAKERS L.S.E *FOR OVER FIFTY YEARS*

NORWICH : MANCHESTER : LONDON : AND BRANCHES

The Functions of PRECIOUS METAL CONTACTS. *No. 7*

Alloys of Silver and Copper

Alloys of Silver and Copper find a ready use as contact metals. Their great advantages are that they are both cheaper and harder than fine silver, and they have good electrical conductivity. Against this, however, their tendency to tarnish which grows greater as the percentage of Copper in the alloy increases, must be taken into consideration.

Contacts of Silver Copper find ready use in certain control mechanisms. In most cases the contact mechanism is so designed that a wiping action takes place and the faces are automatically cleaned.

A typical alloy is:—

PROPERTY	Silver Copper 85% Alloys
Specific Gravity:	10.23
Melting Point °C:	850°
Brinell Hardness: (Annealed)	85
Specific Resistance: Microhms per cm. Cube at 18° C.	2.2

This is the seventh of a series of informative advertisements on Precious Metal Contacts.

Specify BAKER CONTACTS

BAKER PLATINUM LTD., 52, High Holborn, London, W.C.1 *'Phone: Chancery 8711*

MEKELITE INDUSTRIAL LIGHTING UNITS

Two views of the same unit, closed and partly extended, to illustrate range of movement (scale 1/6 full size).

- The epicyclic geared joints give 360° movement. Cabtyre cable can be used without risk of kinking or nipping when the arms are moved.
- The lampholder is protected by the swivelling head which carries the weight of the reflector.
- The connection boxes simplify wiring.
- They cost little to install and nothing to maintain.

MEKELITE Industrial Lighting Units are available with various lengths of arms and pillar. Bases for wall, bench or machine mounting; for conduit or with rubber sleeve entry for cabtyre cable. Also heavy bases for portable use. Small reflectors for 12 volt lamps can be supplied.

May we send you a copy of our catalogue?

MEK-ELEK Engineering Ltd.

16, Douglas Street, LONDON, S.W.1

Telephone: Victoria 5707. Cables: Mekelek London.

G.E.C.

PORCELAIN

Lampholders

FOR ALL TYPES OF

INDUSTRIAL LIGHTING UNITS

G.E.C. Porcelain Lampholders are backed by typical G.E.C. research and manufacturing experience and comply with Home Office requirements and British Standard Specifications where applicable. Reference should be made to the S.I. section of the company's catalogue for the complete range.

MADE IN ENGLAND.

NATIONAL EMERGENCY. *Please assist by saving all packing material for collection when our van calls.*

Classified Advertisements

ADVERTISEMENTS for insertion in the following Friday's issue are accepted up to **5.30 p.m. on Tuesday**, at Dorset House, Stamford Street, London, S.E.1.
THE CHARGE for advertisements in this section is 1/2 per line per insertion, or for display advertisements 14/- per inch, with a minimum of one inch.
FOR SITUATIONS VACANT AND WANTED there is a special reduced rate of 1d. per word if prepaid, minimum 1/-. A Box Number, when required, is charged as six words, and there is also in this case an additional charge of 6d. for postage of replies. Three insertions under these headings can be obtained for the price of two if ordered and prepaid with the first insertion. If placed to account the charge for each insertion is 2/6 for three lines and 9d. for each additional line.

REPLIES TO advertisements published under a Box Number if not to be delivered to any particular firm or individual should be accompanied by instructions to this effect, addressed to the Manager of the ELECTRICAL REVIEW. Letters of applicants in such cases cannot be returned to them. The name of an advertiser using a Box Number will not be disclosed. All replies to Box Numbers should be addressed to the Box Number in the advertisement, c/o ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1. Cheques and Postal Orders should be made payable to ELECTRICAL REVIEW LTD. and crossed. Notes cannot be traced if lost in transit. They must therefore be regarded as being despatched at sender's risk. Alternatively they may be sent per registered post.

Original testimonials should not be sent with applications for employment.

OFFICIAL NOTICE—TENDERS, ETC.

SLEAFORD URBAN DISTRICT COUNCIL

ELECTRICITY DEPARTMENT

THE Council invite Tenders for the supply, delivery, laying and erection of Low-Tension Underground Mains and Overhead Lines.

Specification and full particulars may be obtained from the Engineer and Manager, Electricity Department, West Banks, Sleaford.

Tenders in plain sealed envelopes endorsed "L.T. Underground Mains and Overhead Lines" to be delivered to the Clerk of the Council, Council Offices, 19, Jermyn Street, Sleaford, not later than Noon on Saturday, the 20th July, 1940.

G. B. HEMPSTEAD,
Clerk of the Council.

Council Offices,
Jermyn Street,
Sleaford.
24th June, 1940. 3600

SITUATIONS VACANT

AIR MINISTRY

Civilian Instructors Required

VACANCIES exist for Civilian Fitter Airframe Instructors at an initial rate of pay of £4 5s. a week inclusive, increasing to £4 10s. a week on the satisfactory completion of a probationary period, and thereafter by annual increments of 2s. 6d. per week to £5 per week.

The necessary qualifications are:—

Fitter Airframe.—Instructors must have a good knowledge of airframe component construction and a knowledge of rigging and principals of flight. Knowledge and treatment of materials used in airframe construction are also required.

Successful candidates may be required to undergo a short course of training during the early stages of their employment to fit them for their duties as instructors.

Vacancies also occur for selected applicants with a theoretical or practical knowledge of an allied trade to the aircraft industry who are capable, after a course of instruction, of qualifying as Fitter Airframe Instructors.

Applications should be addressed, in writing only, to the Under Secretary of State, Air Ministry (S.5.d), Kingsway, London, W.C.2, giving particulars as to previous experience, age, etc. Suitable candidates, who must be over 30 years of age, will then be required to attend at the nearest Royal Air Force trade testing centre for the necessary trade test and medical examination, but may be reimbursed the cost of third class locomotion expenses for this purpose. 30

NORTH WEST MIDLANDS JOINT ELECTRICITY AUTHORITY

APPLICATIONS are invited for the position of Charge Engineer, in a temporary wartime appointment, at the Stafford Electricity Works.

The conditions of employment and rate of remuneration will be in accordance with the N.J.B. Schedule, Class E, Grade 8, at present rising from £314 per annum.

Application Forms and List of Duties can be obtained from Mr. F. Favell, M.I.E.E., M.I.Mech.E., Chief Engineer and Manager, on application in writing.

Applications to be returned not later than first post on Monday, the 8th July, 1940.

The appointment will be subject to passing a medical examination for the purposes of the Superannuation Scheme of the Authority.

E. B. SHARPLEY,
Clerk to the Authority.

York Chambers,
Kingsway,
Stoke-on-Trent.
24th June, 1940. 3590

SITUATIONS VACANT—*Continued*

CITY & ROYAL BURGH OF DUNDEE

Assistant to Station Engineer

APPLICATIONS are invited for the above appointment from experienced Engineers of an age preferably not over 40, at a salary in accordance with the National Joint Board Schedule, Class G, Grade 6, at present £431 per annum. A 30,000 kW extension is nearing completion.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the selected candidate will be required to pass a medical examination.

Applicants must have a sound theoretical knowledge and considerable practical training and experience in the operation and maintenance of large modern high pressure boilers, fuel and ash handling plant, turbo-alternators and their associated auxiliaries. The successful candidate will be required to take charge of all overhauls and repairs, and must have the initiative and resource necessary for organising and expeditiously carrying out such work as well as boiler and turbo-alternator efficiency tests. A thorough knowledge of the principles of fuel combustion and steam generation is also essential, and he would also be expected to assist the generation engineer in any special matters relating to the running of the Station.

Applications, stating age, full particulars of theoretical training, experience and qualifications, and accompanied by copies of recent testimonials should be forwarded to the undersigned not later than Thursday, 11th July, 1940.

D. H. BISHOP, B.Sc., M.I.E.E.,
General Manager & Engineer.

Dudhope Crescent Road,
Dundee.
10th June, 1940. 3594

THE SUDAN GOVERNMENT invites applications for the post of WIRELESS INSPECTOR in the Posts and Telegraphs Department.

Candidates should be between 24 and 32 years of age (preferably 26); qualifications as follows:—

(A) Practical knowledge and experience in the installation, testing out, maintenance and running repairs of:—

Medium and Shortwave Wireless Transmitters up to 6 kW. Wireless receiving sets and Direction Finding Equipment.

Internal combustion engines, including Diesels.

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Cells (all types) and charging equipment.

(B) A sound knowledge of Wireless Theory.

(C) Experience in rigging aerials and erecting masts of various types.

The post is a pensionable one, but on five years probation with entry to Scale E2 at £E.324-360 per annum, according to age and qualifications, rising to £E.600 by three or two biennial increases and three triennial increases (£E.1=£1 0s. 6d.).

Further particulars may be obtained from the Controller, Sudan Government London Office, Wellington House, Buckingham Gate, London, S.W.1. Envelopes should be marked "Wireless Inspector." 3589

METROPOLITAN BOROUGH OF FULHAM

Electricity Department

APPLICATIONS are invited for the position of female Showroom Assistant and Demonstrator from persons holding the E.A.W. Diploma or equivalent. Salary according to experience and ability—minimum £125, maximum £225 per annum.

Applications will only be considered from candidates who have had a thorough training in the principles of salesmanship; have had at least three years' experience in a sales position, and can give proved results of their sales ability.

Form of application may be obtained on sending a stamped, addressed, foolscap envelope to the undersigned, to whom completed applications endorsed "Showroom Assistant and Demonstrator" must be delivered not later than noon on 8th July.

WILFRED TOWNEND
Town Clerk

Town Hall,
Fulham, S.W.6. 3592

SITUATIONS VACANT—*Continued*

LINCOLN CORPORATION

Electricity Department

Appointment of Senior Demonstrator.

APPLICATIONS are invited for the position of Senior Demonstrator for the above Department.

Applicants must have a good knowledge of cooking and be able to demonstrate all types of appliances.

Candidates having specialised in "Wartime" cookery and having co-operated with the Ministry of Food will receive special consideration.

Salary in accordance with the Corporation's scale, £150-£200.

Applications, giving full particulars, stating age, whether married or single, should be addressed to the undersigned not later than the 12th July, 1940.

F. NEWEY, M.I.E.E.,
Engineer and Manager.

Electricity Department,
Brayford Side North,
Lincoln.
22nd June, 1940. 3591

MANCHESTER MUNICIPAL COLLEGE OF TECHNOLOGY

(Faculty of Technology in the University of Manchester)

Appointment of
Assistant Lecturer in Electrical Engineering

THE Governing Body invites applications for an Assistant Lectureship in Electrical Engineering in the College of Technology, with the title and status of Assistant Lecturer in the University of Manchester.

Salary according to qualifications (minimum salary £300 per annum).

Conditions of appointment and form of application may be obtained from the Registrar, College of Technology, Manchester. The last day for the receipt of applications is Tuesday, July 9th, 1940.

Canvassing, either directly or indirectly, will disqualify a candidate for appointment.

J. E. MYERS.
Principal of the College
3603

METROPOLITAN BOROUGH OF FULHAM

Electricity Department

APPLICATIONS are invited for nine positions as temporary Clerical Assistants, male or female. Male applicants should be between 16 and 18 or over 41 and females over the age of 17. Male applicants between 16 and 18 must have passed the matriculation or an equivalent examination.

Salaries will depend upon age and experience, with a minimum of £78 and a maximum of £208 per annum.

Applicants should preferably have had experience of general office routine and bookkeeping.

Further particulars and a form of application can be obtained by sending a stamped, addressed, foolscap envelope to the undersigned, to whom completed applications, endorsed "Temporary Clerk," should be forwarded not later than noon on 8th July.

WILFRED TOWNEND
Town Clerk

Town Hall,
Fulham, S.W.6. 3593

APPLICATIONS are invited for the position of Relief Turbine Driver on a rota of shifts at the Corporation's Electricity Works, Watford, at a wage in accordance with the N.J.I.C. Schedule No. 10 Area (at present 21.71d. per hour per 48-hour week). Applicants should be thoroughly competent and familiar with all Turbine Room routine. Experience with Brush-Ljungstrom Turbines will be an added advantage. The position would be superannuable under the Local Government (Superannuation) Act, 1937, and the person appointed must pass a medical examination.—Applications, stating age, with full particulars of experience and copies of testimonials, to be sent not later than Monday, 1st July, 1940, to Arthur W. Barham, Chief Engineer & General Manager, Electricity House, The Parade, Watford. 3572

CLERK, Book-keeper, Typist, with knowledge of electrical terms; S.W. London.—Box 5709, c/o The Electrical Review.

SITUATIONS VACANT—*Continued*

FULLY Experienced Armature Winder Required at once, conversant with A.C. and D.C. Regular work and first-class rate paid.—Box 5658, c/o The Electrical Review.

LINESMEN Experienced in Construction of Overhead Lines on wood poles.—Apply Edmundsons Electricity Corporation, Ltd., Construction Dept., Oxford Road, Newbury. 5702

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REQUIRED, Shift Maintenance Electrician, with experience on A.C. plant and H.T. transformers.—Apply to Manager, The B.P.C.M. Ltd., Shoreham Works, Beeding, Steyning, Sussex. 3563

SHORTHAND-Typist required (for Leeds area) with experience in the Electrical Contracting business and thoroughly capable of typing specifications for large lighting and power installations on all systems of wiring. Good salary offered to suitable applicant. Write stating age and experience to Box 3579, c/o The Electrical Review.

SHOWROOM Manager or Manageress required, London, W.C.; write stating experience, salary, age.—Box 5710, c/o The Electrical Review.

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TRANSFORMER-Fitter, experienced, required.—Brentford Transformers, Ltd., 234a, High Street, Brentford. 3577

APPOINTMENTS FILLED

Dissatisfaction having been so often expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision. We will then insert a notice free of charge under this heading.

BOX 3459.—Mains Engineer. Morley Borough. —Lady Showroom Attendant and Demonstrator.

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A MANAGERIAL or responsible post, works or sales, required by experienced man having held executive positions with reputable electrical firms as works and sales manager, possessing technical commercial qualifications, initiative and drive, proved ability and integrity. Wide connections amongst Electrical Wholesalers, Supply Authorities, large Retailers and Industrial firms throughout Great Britain. Adaptable for undertaking work of national importance. Change desired owing to war conditions. Reasonable propositions invited from principals only. Not liable military service. Located Midlands.—Box 5658, c/o The Electrical Review.

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Increased Production.

THE sixty-first ordinary general meeting of the above Company was held on June 21st in London.

Sir Montague Hughman (the chairman), in the course of his speech, said: When we met last year, notwithstanding the anxious times we were passing through, this country was at peace, but we meet when practically the whole of Europe is in the throes of war. I told you last year we had placed the whole of our resources at the disposal of the Government, and I am glad to say that practically all our work is now in connection with the war, and I will tell you later of the remarkable increase in production which we have achieved.

The balance of trading account at £415,204 is £30,000 lower than in 1938. In arriving at this figure, full provision has been made for our liability for income tax, national defence contribution and excess profits tax. Taxation is now a heavy charge against our profits, and this, with the expenditure on air-raid precautions, is the cause of the reduction in our profits as compared with the year 1938.

Large Carry-over of Orders.

The total turnover for 1939 shows a substantial increase over 1938, and the value of orders in hand at the end of 1939 is higher than in any previous year. Every precaution has been taken for the safety of the staff and workpeople, and we are satisfied that the arrangements we have made meet the case.

When the full history of the contributions to the successful prosecution of the war made by cable-makers in general and by this Company in particular are published it will be found that we have fully appreciated our national duties and shouldered our responsibilities to the Government in no half-hearted manner.

The contract department has had another successful year; the turnover has shown a substantial increase and the overhead charges a reduction. Business outside British possessions has been difficult but results have been satisfactory.

Holborn Construction Company, Ltd.

Although no details can be disclosed, this subsidiary can claim that it completed just prior to the outbreak of war one of the most important Government schemes for national defence in the country. This scheme is undoubtedly making a vital contribution to the country's needs at the present moment.

With regard to the future, I am sure that with the world in its present state you would not expect me to give you any forecast as to what might happen to this Country in the days to come. May I just say this, that we are striving in every way possible to carry out the requirements of the Government at home and overseas in order to do everything in our power to help to win this war and so free the world from the tyranny and cruelty under which Europe is suffering at the present moment.

Mr. W. F. Bishop's Remarks.

Mr. W. F. Bishop said: Up to the outbreak of war our business was progressing very satisfactorily, and a considerable volume of important work had been or was being carried out, particularly in super-tension cable, in which our output was greater than ever before, and we felt the advantage of the additional plant and equipment recently installed. Fortunately we were able in most cases to complete our contracts, and in the few cases that had perforce to be suspended we were able to make arrangements with our customers which were satisfactory to both parties.

Henley's Tyre and Rubber Co.

Up to the outbreak of war the progress made in our tyre sales, both giant and car, was eminently satisfactory and considerably exceeded even our anticipations, showing that the work put into this subsidiary during the last few years was reaping its reward. After war broke out and the use of cars for private purpose was so greatly restricted, our sales of car tyres naturally decreased, but on the other hand the sales of giant tyres were greatly increased. 3584

IN STOCK

A high-precision machine this, one that is profitable in the toolroom and on general production work. Built throughout for lasting accuracy yet reasonably priced. Easily operated and dependable for continuous duty.

Capacity: 18in. by 6in. by 11½in. high, with grinding wheel 7in. dia. by ½in. face and 1¼in. hole.

And note that we can deliver from stock.

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of Large Firm writes . . .

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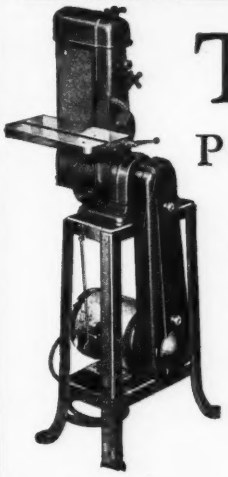

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This 6in. Belt type Sanding Machine can be used for sanding, polishing and finishing operations in both wood and metal. It may be used vertically as shown in illustration or can be set horizontally if required.

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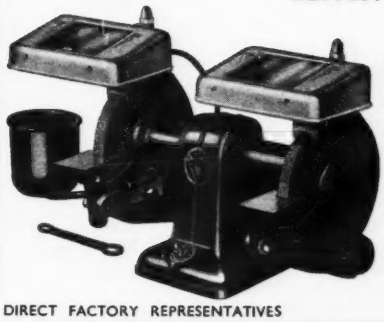

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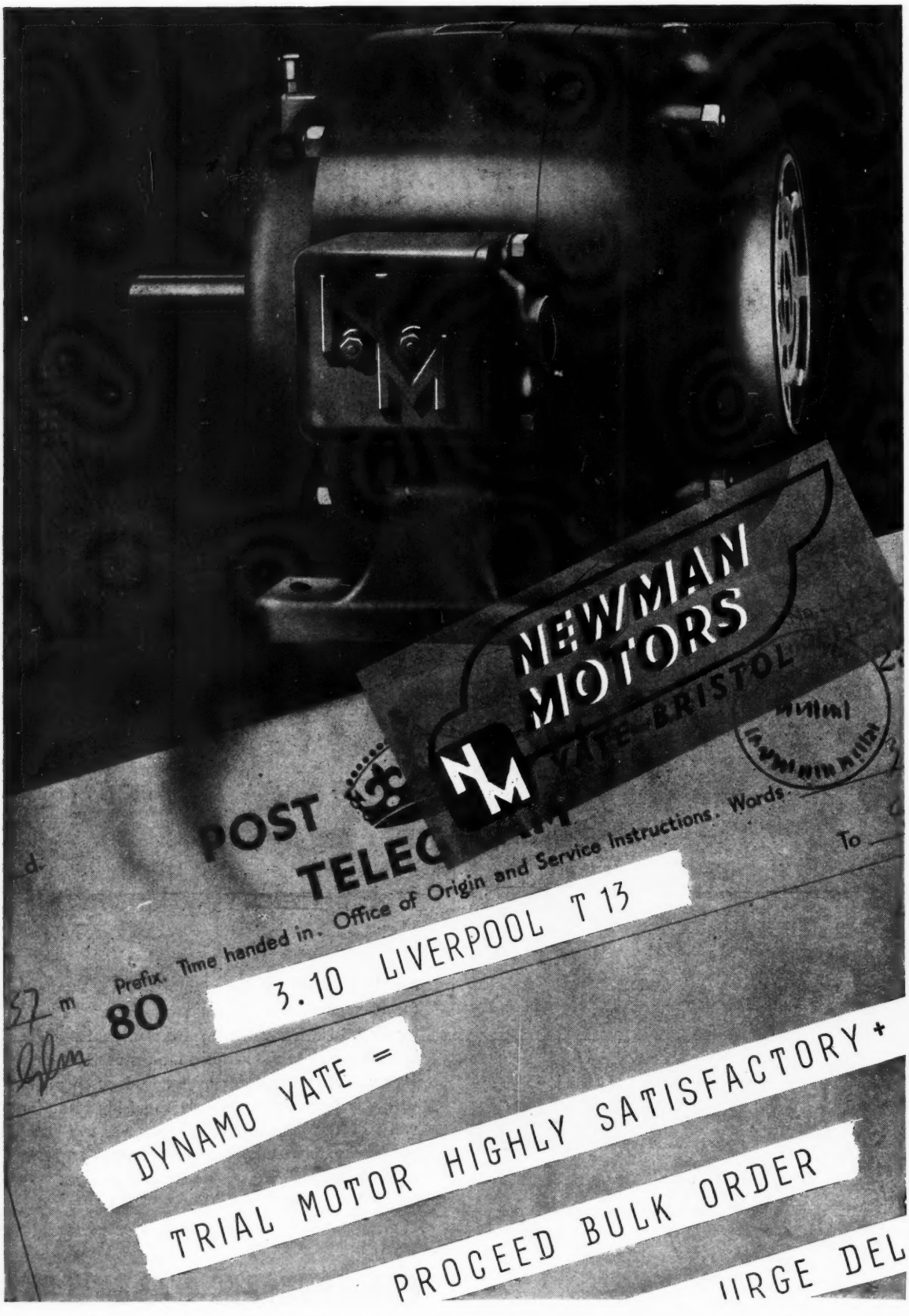

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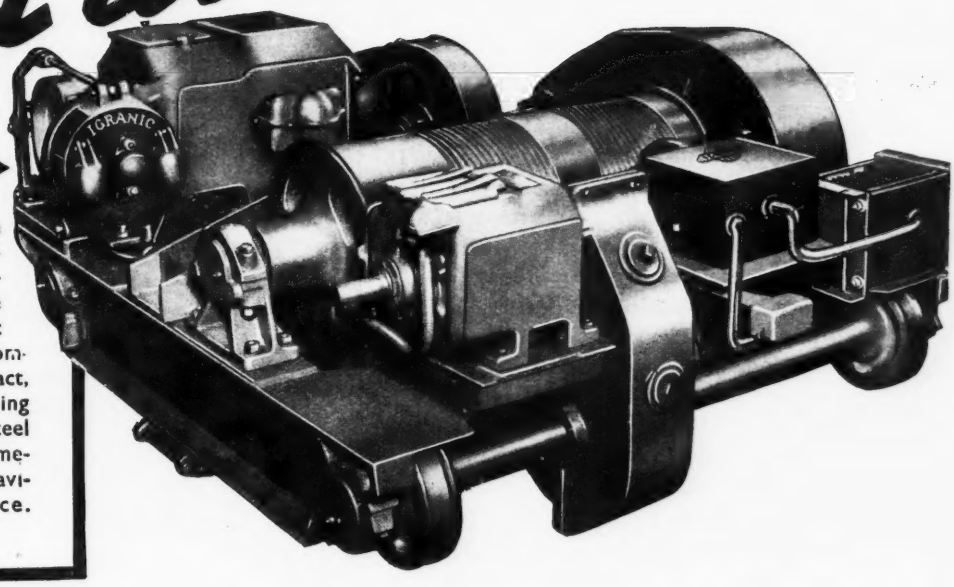

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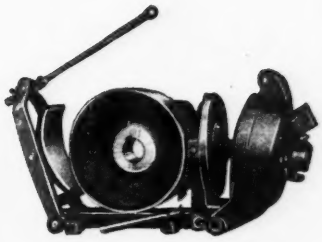

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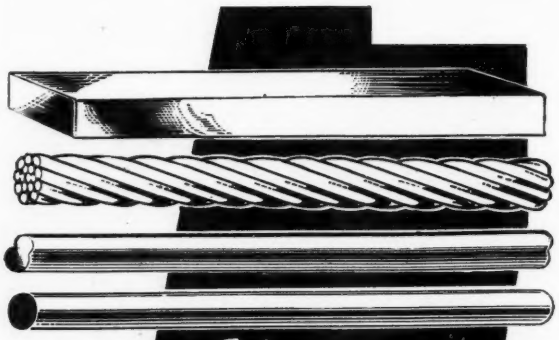

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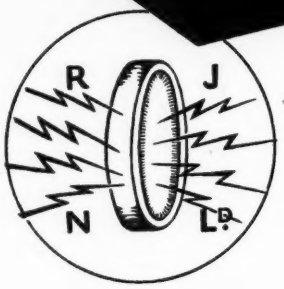

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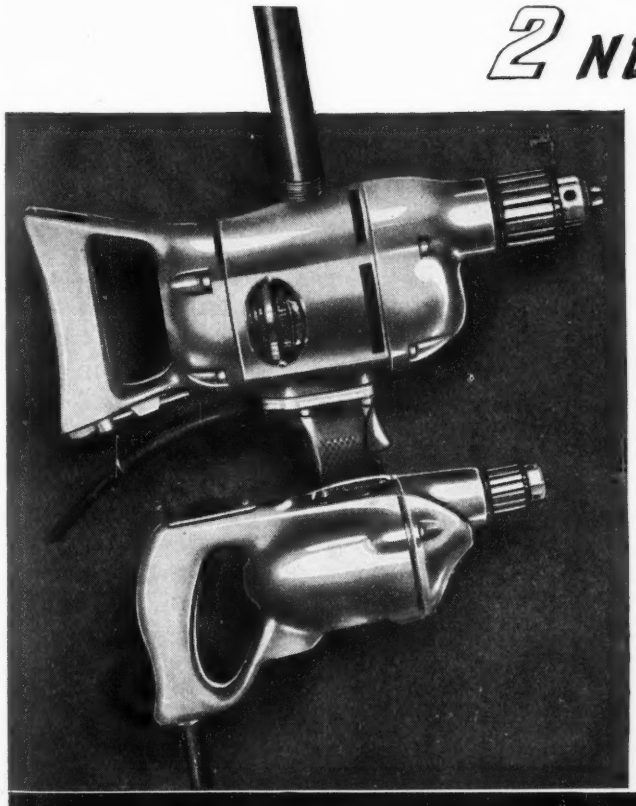

These new Van Dorn ¼" and ½" "JUNIOR" Drills embody many improvements and quality features that give greater usefulness and better value. Oil impregnated bearings, threaded-on chuck, sturdy cord protector and clamp are now standard to both models. In addition a close coupled construction gives lighter weight and shorter length resulting in better operating balance without nose heaviness. The ½" "JUNIOR" also has a new motor that gives 20% more power and 40% greater torque.

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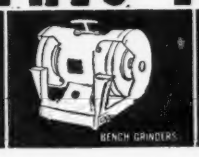
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SCREWDRIVERS

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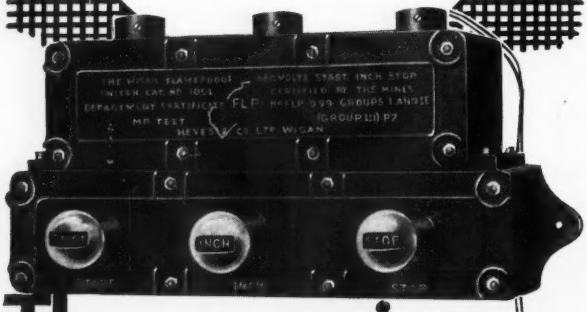

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We manufacture three types, viz— (1) SINGLE POINT, (2) TWO POINT, (3) THREE POINT. A greater number of points may be obtained by a combination of switches, e.g. a five point unit can be obtained by installing TWO POINT and THREE POINT Switches.
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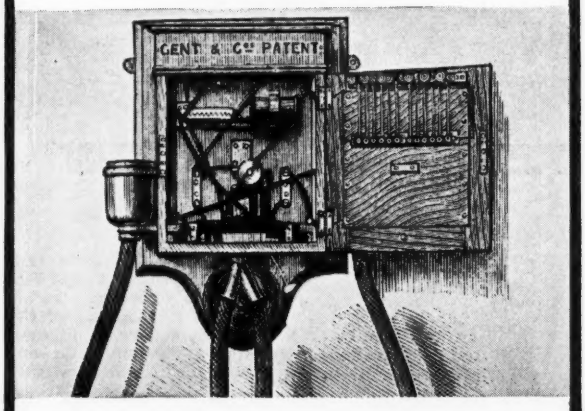

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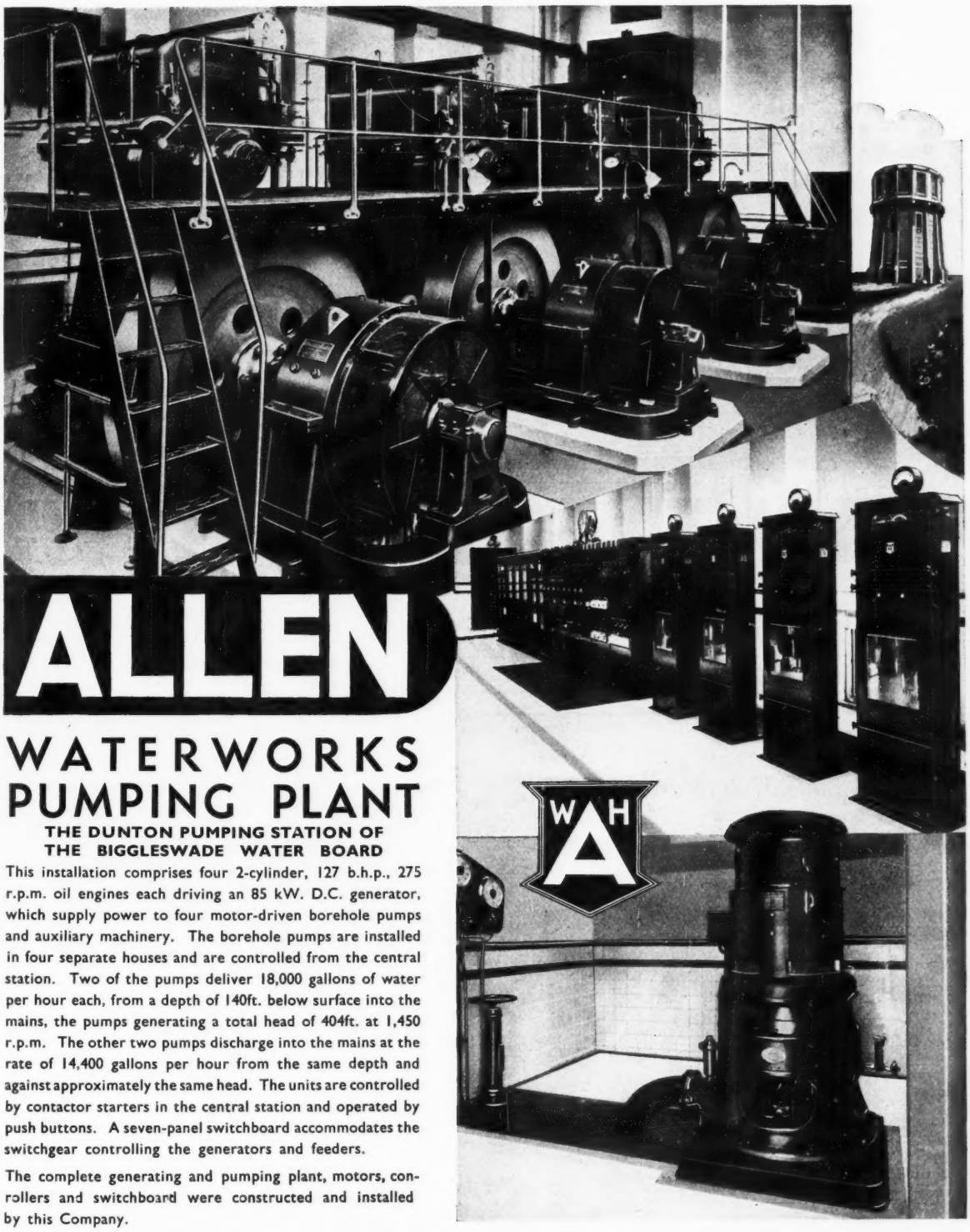

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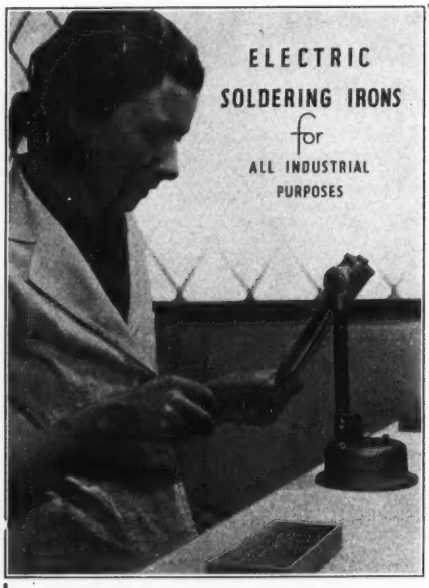

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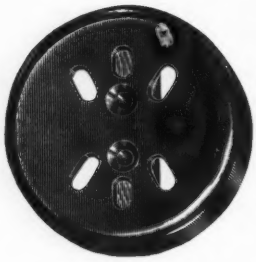

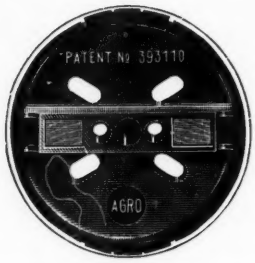

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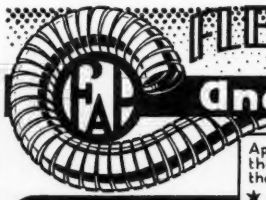

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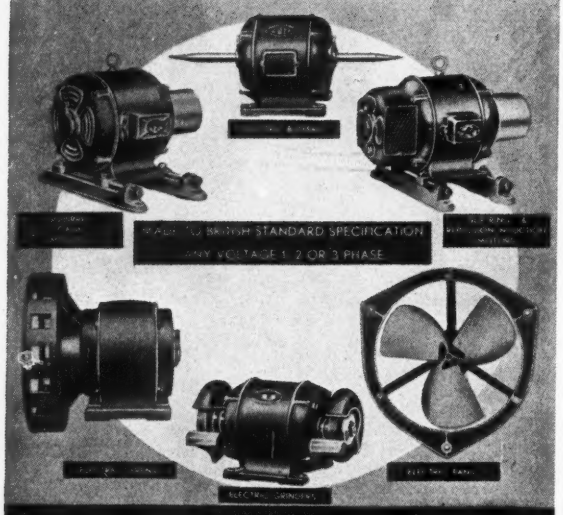

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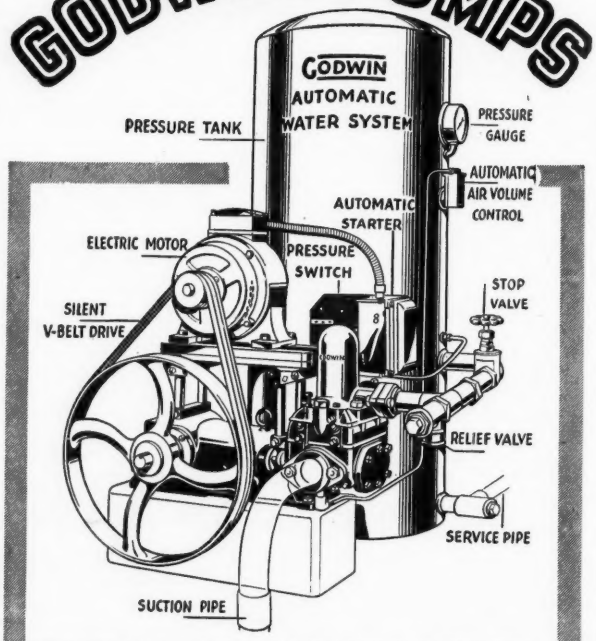

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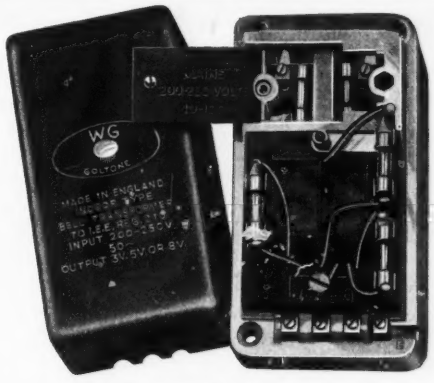

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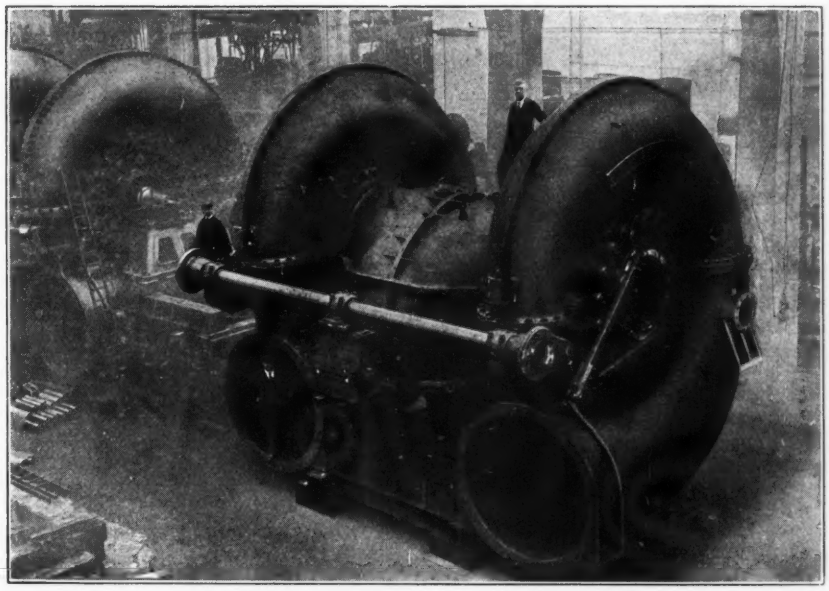

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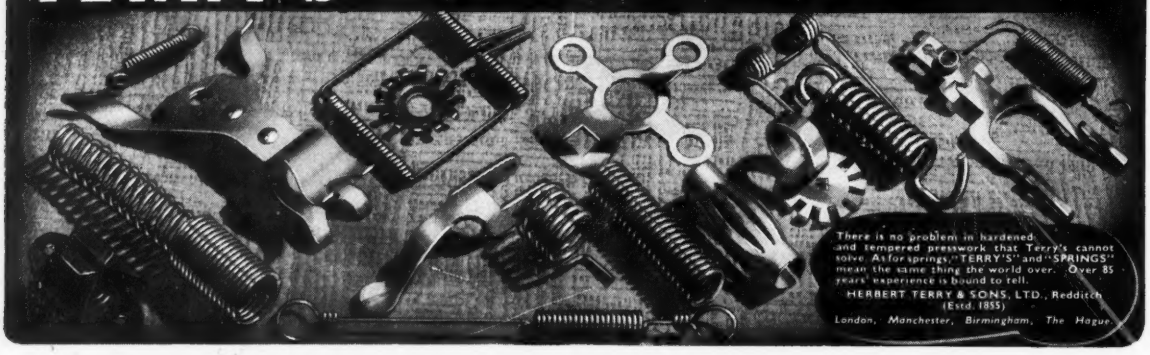

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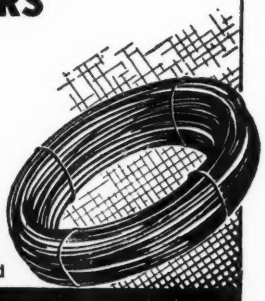

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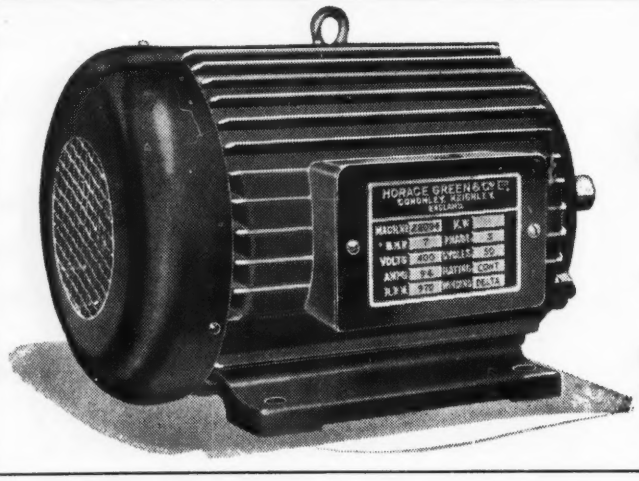

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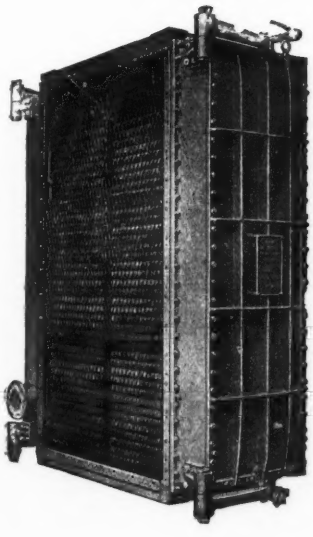

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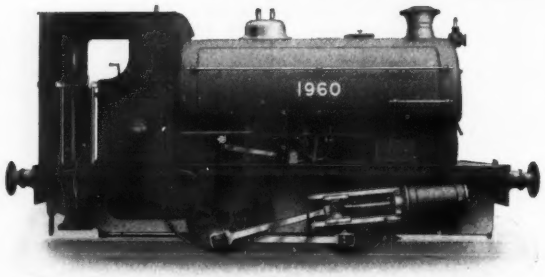

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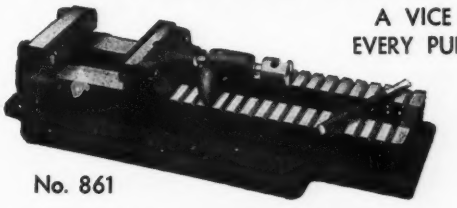

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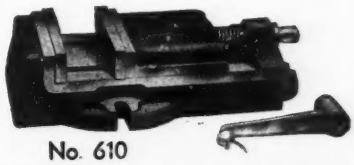

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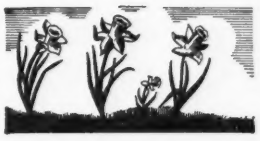

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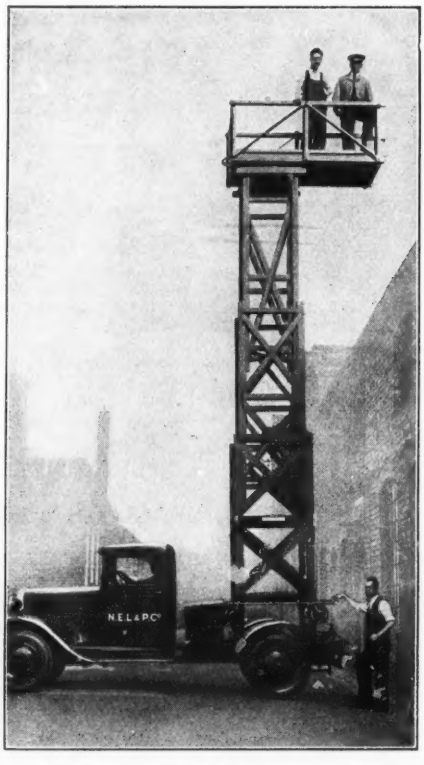

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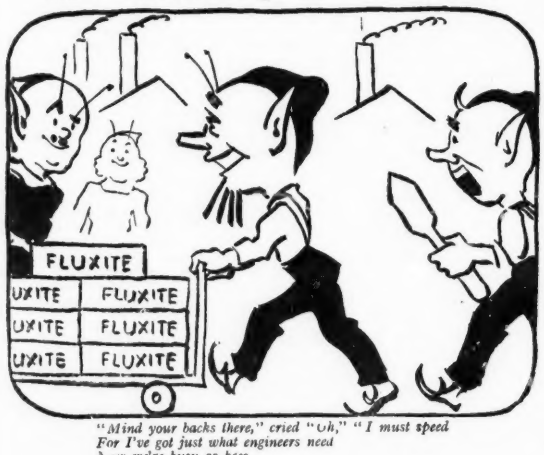

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For I've got just what engineers need
Now we're busy as bees,
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That Fluxite's needed most—that's agreed."

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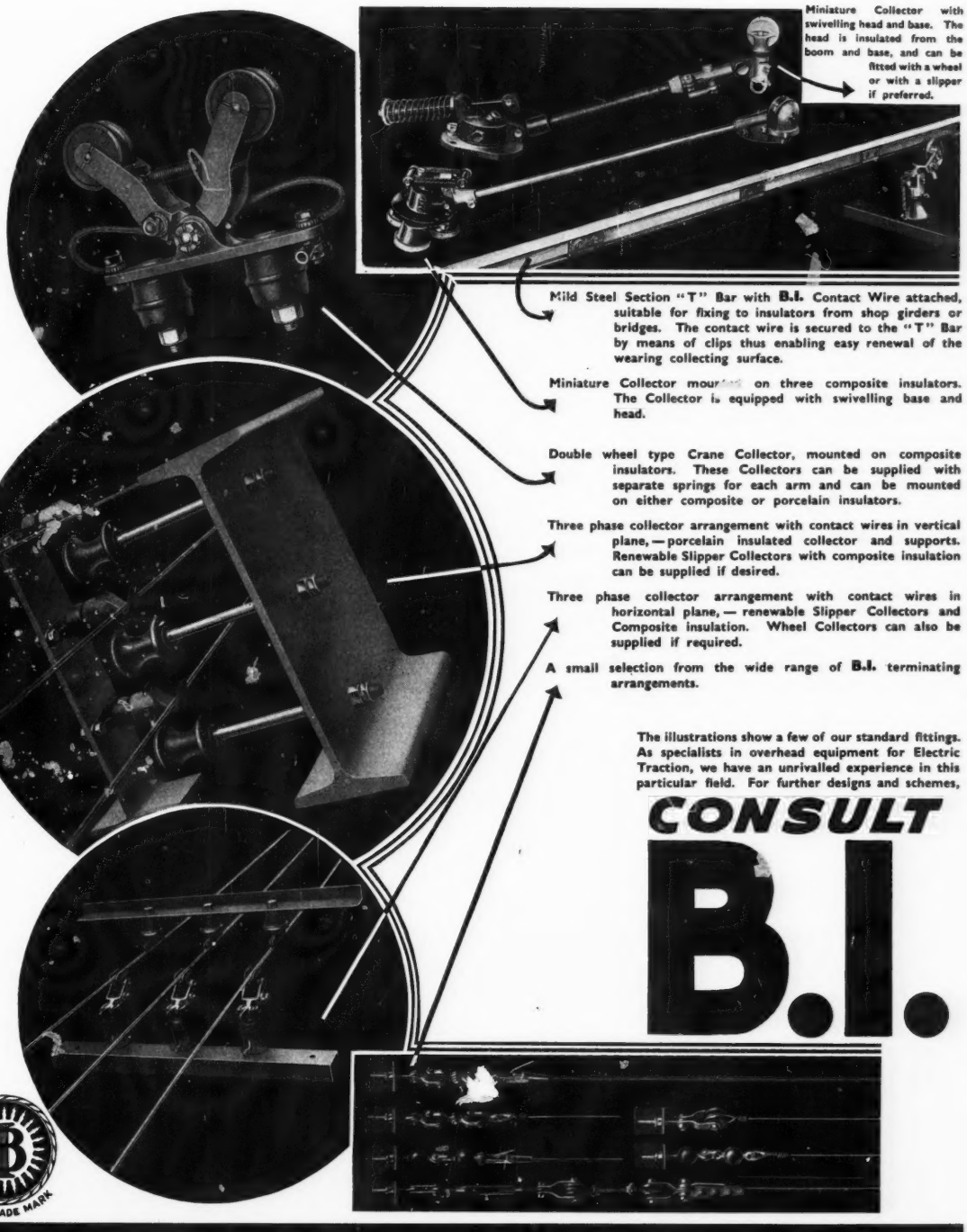

Miniature Collector with swivelling head and base. The head is insulated from the boom and base, and can be fitted with a wheel or with a slipper if preferred.

Mild Steel Section "T" Bar with **B.I.** Contact Wire attached, suitable for fixing to insulators from shop girders or bridges. The contact wire is secured to the "T" Bar by means of clips thus enabling easy renewal of the wearing collecting surface.

Miniature Collector mounted on three composite insulators. The Collector is equipped with swivelling base and head.

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Three phase collector arrangement with contact wires in vertical plane, — porcelain insulated collector and supports. Renewable Slipper Collectors with composite insulation can be supplied if desired.

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A small selection from the wide range of **B.I.** terminating arrangements.

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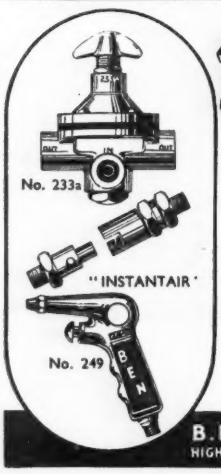

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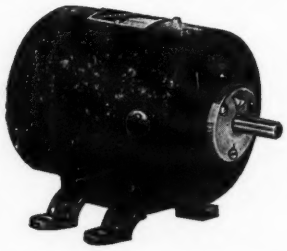

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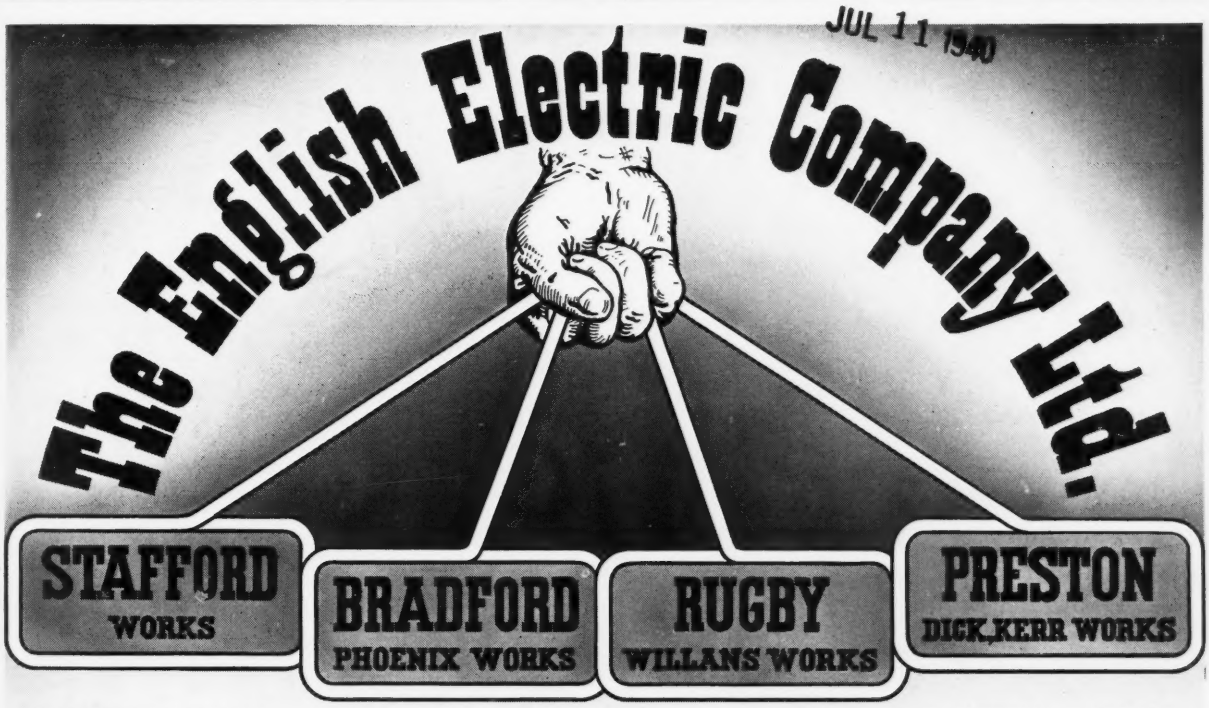

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"We shall defend our island whatever the cost may be. We shall fight on the beaches, we shall figh

landing grounds, in the fields, in the streets and in the hills. We shall never surrender."—Mr. Chur

SAVING SCRAP VITAL TO WINNING WAR

WE are still wasting thousands of tons of scrap material that could be used to help win the war.

Mr. Herbert Morrison, Minister of Supply, appealed yesterday to every one to do more to help salvage this material.

"Metals, paper, rags, food waste and bones, unromantic as they may seem, are of vital importance for our war effort," he said.

"It is essential that they should be recovered and put to good use in increasing quantities.

SALVAGE DRIVE

The Minister knows that many people, anxious to help, find difficulty in getting their waste collected.

That is one problem that will be tackled by the committee of workers M.Pa appointed by him this week to assist in the salvage drive.

Meantime, Mr. Morrison urged yesterday that every individual should take steps to ensure that everything possible in his or her possession or passing through their kitchens should be put at the disposal of the country.

He told as an example to be followed, of the offer by Countess Roberts, daughter of the late Field Marshal Earl Roberts, to place at the country's disposal all the many trophies of war which came to her father.

These include field guns and cannon from every one of his campaigns.

INSPIRING LEAD

"Let the whole country accept it as a lead," said Mr. Morrison, "and let the world record it as what it was—a symbol of the intense will to victory that inspires the whole country.

"And now, dumps in 10,000 villages and hamlets throughout England and Wales will be organised by the Iron and Steel Control of the Ministry of Supply in the next few weeks.

"The aim of the scheme is to collect at least 50,000 tons of metal in voluntary effort which would otherwise never reach the furnaces.

Speaking of the production of ... the Minister said ... special emphasis ... appeals for ...

R.A.F. BOMBERS ATTACK BRIDGES

Vivid flashes of green, red and yellow, up to a height of 4000 feet, were seen when one of an R.A.F. night bombing formation scored a direct hit on what appeared to be an important German munitions dump, says Associated Press.

The objective was inside Germany, near an important battle-area, by which enemy supplies and reinforcements cross the Meuse into Luxemburg and Belgium.

Within split seconds of the detonation of the bombs the dark night sky was streaked with a continuing series of flashes.

During a series of daylight raids on a strategic road and railway in North Eastern France medium bombers scattered strings of bombs along the permanent way and swooped low to machine-gun German anti-aircraft posts at the roadside.

A wood concealing an anti-aircraft battery was observed with bombs. A column of motor transport was attacked.

ALL SAFELY BACK

All the aircraft in this operation returned safely.

Another formation of more than 40 bombers attacked cross-roads, railway bridges an important junction and a town where German troops were known to be concentrated in the south-east corner of Belgium.

Although scores of ... swept the sky and the ... peppered with anti-... some swept as low as ... press home machine-gun ... two trains.

Again all the aircraft returned safely, although one had to land, without ... damage, behind the Allied lines.

The pilot who yesterday ... machine-gunning ... of last week's raids ... and ... made to-day a ... continuous for six hours.

10 BRITISH SHIPS SUNK IN A WEEK

Half Average Losses

Mercantile losses due to enemy action during the week ended midnight on Sunday, May 26, amounted to 45,225 tons, it was officially announced to-day.

British losses were ten ships—representing about half the average weekly losses during the war ... total tonnage of the ships lost was: British, 10,913 tons; four Allied ships, 12,996; four neutrals, 21,316.

Losses include two hospital ships—the Brighton and the Maid of Kent—which were sunk by aircraft.

The small tonnage lost is due to the fact that most of the vessels were of less than 1000 tons.

The total of the unsunk and unchased German mercantile losses remains substantially unaltered at 930,000 tons.

Up to May 19, 22,171 British, Allied and neutral ships had been convoyed in British convoys, with a loss of only 15 ships giving a loss ratio of 1 in 715.

Neutral ships convoyed numbered 3121, with a loss of three, giving a loss ratio of 1 in 1040.

"BEGRUDGE NOTHING"

To the Editor of The Daily Telegraph

Sir—Let us remember the saying "Let us live those who help themselves." All of the free peoples of this earth would say that life will have no value when the Nazi monster and all it stands for has subjugated the rest of the world, which is its aim. What home life will these be if children are taught to obey their parents? As for possessions, they would be worth nothing if the enemy was victorious.

20 Fight 80—And Bag 12

OUTNUMBERED four to one, a squadron of Britain's latest fighters, Boulton-Paul Defiants, brought down 12 German machines over Dunkirk yesterday.

Seven Defiants accompanied by nine Hurricanes took off from an aerodrome in the South East of England just after noon, says the British United Press.

When they were over Dunkirk 80 ... aircraft, 12 of the 80 type were sighted beneath them and the Defiants and Hurricanes dived to the attack.

SURPRISE SWOOP

Before they had time to fire more than a few rounds of more German—Messerschmitt 110's and Heinkel fighters ... swept down on them.

The Defiants and Hurricanes kept firing ... their ammunition was ex-

"A MIRACLE OF DELIVERANCE"

BY OUR OWN REPRESENTATIVE

WESTMINSTER Tuesday.

Never has a Prime Minister more magnificently matched himself to a great occasion than did Mr. Churchill this afternoon. In a speech which lasted only 34 minutes he unfolded to the House of Commons the story of "a miracle of deliverance" for which he had not dared himself to hope when he warned them last week to be prepared to face "hard and heavy tidings."

Making no attempt to minimise the consequences of a "colossal military defeat," unflinchingly facing the possibilities, even darker of the future, the Prime Minister ended with a peroration which will be quoted and remembered throughout the Empire for its resolute determination. His speech was punctuated with cheers, but his claim to speak for the House and the nation needed no such justification.

He began by a reappraisal of the Sedan break-through, and revealed that the original French plan of closing the gap had to be abandoned in face of the force of the German penetration.

EPIC OF CALAIS

Surrender Call "Spurned"

The defence of Boulogne by the Guards was ended by orders from this country. Calais was defended to the last by the Rifle Brigade, the 60th Rifles, and the Queen Victoria's Rifles, with a battalion of British tanks and 1,000 French troops—in all, about 4,000 men. The British Brigadier had "spurned" the German demand for surrender.

"Four days of intense street fighting passed before a silence reigned over Calais, which marked the end of a inestimable resistance."

Thirty unwounded survivors were brought off by the Navy. The fate of their comrades was unknown. But their sacrifice had not been in vain. Their resistance had engaged two German armoured divisions, and thereby enabled the Gravelines water-line to be flooded and held by the French. "This," said Mr. Churchill, "that the port of Dunkirk was kept open."

ARMIES

Leopold's defection, which exposed our whole flank and means of retreat. At short notice, the British had to cover their 30-mile flank to the sea and in doing so lost contact with two of the three French corps.

"Now it seemed impossible that any large number of Allied troops could reach the coast.

AIR FORCE VICTORY

"Out of Jaws of Death"

Mr. Churchill paused. "Now suddenly the scene is clear," he said. "A miracle of deliverance has been achieved by valour, perseverance, perfect discipline and faultless service. The skill and resource and unconquerable fidelity is manifest to all. The enemy is hurled back by the retreating British and French troops. It was so roughly handled that it dared not molest their departure."

He went on to speak of the triumph of the Air Force, which had defeated the main strength of the enemy Air Force and inflicted losses of at least four to one.

The pent-up cheers burst out at the Prime Minister's announcement, which followed that "over 335,000 men, French and British, were carried out of the jaws of death, to their native land and to the tasks which lie immediately before them."

The note of warning followed at once. This was not a victory. Wars were not won by evacuations. Yet there was a victory within the deliverance. It belonged to the Air Force.

PILOTS VINDICATED

Superiority Over Enemy

"All our types and all our pilots have been vindicated," Mr. Churchill continued. "The Hurricane Spitfire and the new Defiant all have been vindicated as superior to what they have to face. Triumphant under these conditions, their prospects when defending their native land would be greater. "I must say that I find in these facts a sure basis for practical and reasurable thoughts."

Returning to the ... he revealed that ... Leopold ... Belgian ... Allies ... Belgium ... Allied ... Dunkirk ... Allied ... Dunkirk ... Allied ... Dunkirk